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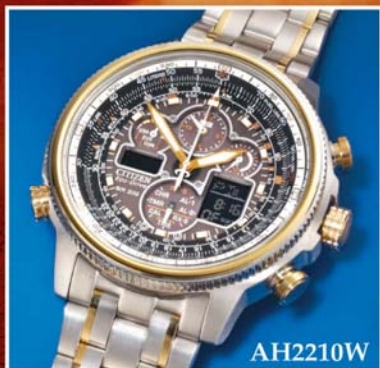


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Published quarterly by:
The Aviation Historian
PO Box 962
Horsham RH12 9PP
United Kingdom

Subscribe at:
www.theaviationhistorian.com

ISSUE NUMBER 8
(published July 15, 2014)



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Published quarterly by *The Aviation Historian*,
PO Box 962, Horsham RH12 9PP, United Kingdom

© *The Aviation Historian* 2014
ISSN 2051-1930 (print)
ISSN 2051-7602 (digital)

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The Aviation Historian®

The modern journal of classic aeroplanes and the history of flying

Editor's Letter

OUR COVER LINE — “It is my most beautiful aeroplane” — comes courtesy of Sir Sydney Camm, who described his supremely elegant Hunter design thus. The shapely Hawker fighter features in three of our stories in this issue. One of them covers its use by the Indian Air Force in Exercise *Shiksha*, a little-known 1963 operation in which Nato forces gathered for a show of strength in response to Chinese aggression on India's border. In another, it makes an impish appearance in Niels Helmø-Larsen's true-life tale of a Danish Hunter which arrived, intact, back at its base without its pilot. Finally, it plays a central role in the life story of test pilot and aircraft designer David Lockspeiser, who died in March, and whose life we celebrate with a tribute from friends and family.

The lot of the test pilot informs the third part of our exclusive serialisation of Frederick Warren Merriam's long-lost book manuscript, in which John Lankester Parker recalls his early years in aviation, when he had to overcome not only considerable physical shortcomings but also the withering initial scepticism of the man who would become his long-term employer, Horace Short. We continue our ongoing World War One centenary commemorations with Mike Goodall's look at Noel Pemberton Billing's fabulously eccentric four-winged “Battle Planes”, and we visit the more recent past with Ben Dunnell's fascinating feature on the British post-Falklands evaluation of Argentina's much-vaunted IA-58 Pucará.

And that's just the half of it. So, without further ado . . .

FRONT COVER A typically magnificent study of the first production Hawker Hunter F.1, WT555, taken by the company's in-house photographer CYRIL PECKHAM in early 1955. It was very nearly Peckham's last photograph — all will be explained in TAH soon!

BACK COVER: Clockwise from top left: KLM Douglas DC-2 PH-AKI at Fornebu Airport, 1939; the Short Mayo Composite; a Heinkel He 111 of KG 26 in September 1939; Fairey Fulmar N1854/G-AIBE at Farnborough in 1962; the prototype Chrislea Super Ace.

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In 1962 photographer Kenneth Brookes captured some magnificent images of Merlin-powered "old boys" at Farnborough — we publish them here for the first time

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Dr David Baker introduces a series on the USA's ambitious Cold War spyplane projects with the contribution of British engineer Randolph Rae and his hydrogen-power concept

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Richard T. Riding tells the full story of the Chrislea Aircraft Co, from the pre-war Airguard to the Ace, Super Ace and Skyjeep series. If it hadn't been for *that* control system . . .

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An unusual collection of wartime photographs of American fighters being delivered to Liverpool docks prompts Philip Jarrett to wonder why they were all marked as "UGLY"

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In January 1960 Royal Danish Air Force Hunter 47-415 landed back at its base at Skrydstrup. Nothing unusual in that. Except that its pilot was dangling from a parachute several miles away, as Niels Helmo-Larsen relates

130 OFF THE BEATEN TRACK

AIR CORRESPONDENCE



Letters to the Editor

Z not K

SIR — Regarding the photograph captioned as “Junkers Ju 86K, B 3” in the *Mosquito vs Bull* article on page 23 of *TAH6*, the picture actually shows the sole *Flygvapnet* Ju 86Z, which was designated Tp 9. Originally WNr 0860959 / D-AXWZ, it was the unique Ju 86Z-7, being equipped with two Pratt & Whitney Hornet S1E-G 750 h.p. radial engines. On April 9, 1938, it was registered to AB Aerotransport (ABA) as SE-BAE, and named *Svalan* (Swallow). It was used as a mail carrier until *Flygvapnet* bought it from ABA in 1940 for use as a passenger transport; it was withdrawn from use in 1958, having accumulated 2,991 flying hours.

The Tp 9 visited the UK on quite a few occasions in the late 1940s during the delivery flights of Mosquitoes, Vampires and Venoms. During an air display on May 22, 1960, the aircraft was intentionally destroyed during a spectacular air-to-ground attack by A 32A Lansens. To make sure that the thousands of spectators would not be cheated out of the “fireworks”, pre-set explosive charges (installed just in case the Lansen pilots missed their target) were set off, destroying the venerable old Swallow completely. Sad, but true!

Jan Forsgren Gävle, Sweden

Yes you can. No you can't

SIR — I read Ben Dunnell's article *Falklands Confidential* in *TAH5* with great interest, but I have to say that my own experience in the Falklands varied by 180°!

In the summer of 1982 I was an RAF squadron leader fighter controller and was sent to the South Atlantic to help provide continuing air defence. Our land forces had captured an Argentinian radar — a Westinghouse T43 — which had been sabotaged just before capture. Some enterprising defender had destroyed a major component, but the Americans were refusing to sell us a replacement. And so we had to wait a further month or so before we had our own radar — an S259, which had been transported from the UK — fully operational.

Alan Harris Tibenham, Norfolk

[A case of the left hand not knowing what the right hand was doing? — Ed]

Telling our Farsi from our . . .

SIR — The caption to the photograph of Blackburn Universal G-AOEk on page 111 of your article *Send in the Heavy Mob!* in *TAH7* claims the Arabic means “Try Your Strength”. It's actually a phonetic rendition of “Blackburn Universal” in Arabic letters, and even uses a Farsi



LEFT Jan Forsgren sent *TAH* this rare photograph of Junkers Ju 86Z-7/Tp 9 SE-BAE — see his letter on this page.

Book winners

Our Gloucestershire Airport Book Competition in *TAH7* was won by: **Ken Mace** of Axbridge, Somerset; **Geoffrey Newman** of Patchway, Bristol; and **Andrew Smith** of Broadstone, Dorset. Well done, the West Country! And thanks and commiserations to all the other entrants.



Another photograph via Stephen Greensted (see Ian Sales's letter), showing the Arabic lettering which creates a tautologous inscription on the nose of Blackburn Universal G-AOEK. Bryan Greensted is fourth from left.

letter for "v" as no such phoneme exists in Arabic.

Otherwise, an excellent journal and I look forward to each issue.

Ian Sales *Sheffield, South Yorkshire*

[The moral of this cautionary tale: when writing captions, don't necessarily believe your Putnams — Ed]

End of an Empire

SIR — I much enjoyed reading *TAH5*, and indeed gazing at the cover image [of *Short Empire Flying Boat G-ADUT*]. What a great picture of New Zealand fashion! And note the small dog on the launch, barking his best at *Centaurus* taxiing by.

The aircraft had a tragic end at Broome in March 1942, when a force of Zeroes shot up the large flotilla of moored Catalina and Dornier flying-

boats, packed with Dutch refugees. There had been no warning of the attack, with the thought that Broome, on Australia's north-west coast and well away from Darwin to the north-east, was out of range of Japanese fighters.

The flying-boat remains are still there, protruding from the mudflats, more than 70 years later.

I have spent some time researching the eventual fate of G-ADUT, and here are a couple of links to Broome and its collection of 15 sunken flying-boats — they are now a tourist attraction, using a hovercraft or simply wading out and seeing some of the remains at very low tides:

■ www.youtube.com/watch?v=RfbkNGT1r-A

■ www.pacificwrecks.com/provinces/australia/western/broome/03-03-42/index.html

The surprise attack by nine Zero fighters on

Broome on March 3, 1942, has been subject to much debate as to how many died and actual losses. Locals thought that the town was being bombed, but what they had witnessed was the Zeroes jettisoning their external fuel tanks before shooting up the flying-boat anchorage.

As well as the two Empire 'boats, 13 other flying-boats were destroyed and sunk by gunfire; five Dutch Navy Do 24s and four Catalinas, taking with them at least 80 people, many of them Dutch women and children, fleeing from Java. The exact number may never be known.

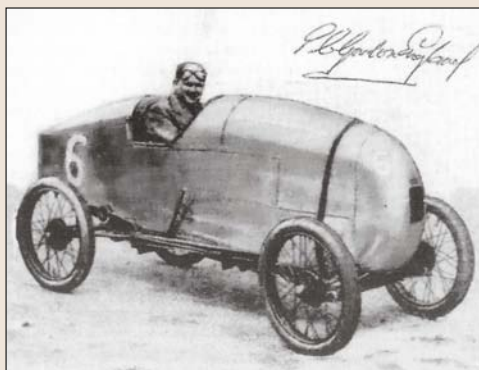
The RAF and the US Navy lost two PBV Catalinas each. One Zero was claimed to have been brought down by local ground fire, but it has never been officially confirmed, while another safely ditched on the return 550-mile (890km) flight to Kupang, Timor. The remaining seven returned to base, sporting bullet holes. Broome airfield was hit too, the Zero force accounting for two USAAF B-17s and a B-24, while a pair of Dutch DC-3s, a Lodestar and an RAAF Hudson were also destroyed on the ground. Another B-24 had just taken off with wounded servicemen and this too was shot down over the sea, with only one survivor making it back to shore.

The early-morning attack on Broome and earlier at Darwin led to speculation that Japan was intent on invading Australia, but Japanese commanders merely wished to protect their right flank as their forces swept into Java and beyond.

As to the wreckage of G-ADUT *Centaurus*, it is thought to lie further out, in deeper water, at Roebuck Bay, Broome. The YouTube link shows it and the Qantas Empire 'boat G-AEUC floating at their moorings before the attack.

Roger Carvell *Hitchin, Hertfordshire*

Eric Gordon England from flying to motor-racing



SHORTLY AFTER we pressed Issue No 7, containing the chapter from F. Warren Merriam's lost manuscript of *Echoes From Dawn Skies* in which Eric Gordon England described his early exploits, TAH visited Brooklands Museum in Surrey. The article had included a photograph (on page 44) of one of Gordon England's 1920s racing cars, and we were keen to find out more — not least because another of his cars is actually preserved and on display in the museum's historic Clubhouse.

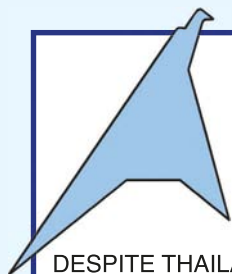
Brooklands Trust volunteer John Barker happened to be on site that day, and did some research for us. The photograph turns out to be Gordon England's "Barrel" racer, and was taken — like the heavily-retouched but signed picture of the same vehicle ABOVE — at Brooklands' Whit Monday race meeting on May 21, 1923. The car took part in several races (wearing different race numbers) on that day, and the photograph in TAH7 showed it wearing No 17 for Race No 9 — with Eric Gordon England himself at the wheel.

Many thanks to John Barker for his efforts.



Have one on us: this side profile, depicting Caproni Ca.114 28-4-6 of the Peruvian Aviation Corps' 28 Escuadrón de Instrucción in 1943, couldn't be accommodated in our Wings over Peru article in TAH7, so we present it here as a bonus.

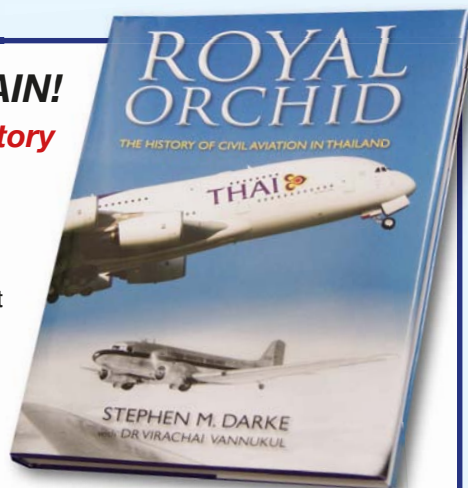
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Former Vietnamese “royal barge” Liberator F-VNPN in later guise as F-OASS, probably at Le Bourget — see Bob Livingstone’s letter below.

A royal Liberator’s fate

SIR — Howard Carter, at the end of his article *Fit for the King* in *TAH6*, states that he would like to plug the gaps in the story.

I am able to add a little more.

After Liberator G-AHYB was sold to Alpes Provence it was registered F-BEFR in April 1951 and named *La Joie de Paris*.

It was not re-registered F-VNPN to Service Imperial Aérien until May 1952.

At some later stage (I do not have a date) it was registered to SATI (Société Aéronautiques de Transports Intercontinentaux) then SCANA (Société Commerciale d’Aviation Nord Africaine) of Rabat, Morocco, as F-OASS. It was last known, derelict, at Le Bourget in 1959 and is assumed

to have been scrapped shortly afterwards.

I have not found a photograph of it as F-BEFR (and I’d love to see one), but the accompanying image shows it as F-OASS, probably at Le Bourget in 1959.

Bob Livingstone *Brisbane, Australia*

Airfield about-turn

Following publication of Malcolm Barratt’s letter in *TAH7*, asserting that the heading photograph of a Mosquito NF.19 in Sweden’s Midnight Mosquitoes in *TAH6* was taken at Woodford and not Hatfield, Royal Air Force Museum Head of Collections Ian Thirsk assures *TAH* that it was indeed taken at Hatfield.

So, readers: “As you were!” — Ed



Rocket Man

THIS NEW painting, *Rocket Man*, by Michael Turner PFGAvA, caught *TAH*’s eye — it depicts Capt Albert Ball’s September 15, 1916 rocket attack on three LFG Roland C II reconnaissance biplanes. While searching for observation balloons to attack, Ball happened upon the Rolands and broke up their formation with an electrically-fired salvo of all eight of his *le Prieur* rockets. He then shot down one of the enemy aircraft with his Nieuport 17’s machine-gun. The painting is just one of many displayed at the Guild of Aviation Artists’ 44th annual Aviation Paintings of the Year exhibition in London’s Mall Galleries (July 21–27).

■ www.gava.org.uk

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DAVID LOCKSPEISER

1927–2014

David Lockspeiser, who died on March 24, 2014, dazzled peers and public alike with his precise and elegant Hunter displays during the 1950s and 1960s, and later established himself as a fine aircraft designer with his ingenious Land Development Aircraft. With help from friends and relatives, we pay tribute to one of British aviation's great all-rounders

BORN IN FARNBOROUGH, Hampshire, on April 12, 1927, David Lockspeiser was the only son of Ben (later Sir Ben) and Elsie Lockspeiser, and younger brother of Judith and Frida. His father was a distinguished scientist and engineer who had served with the Royal Army Medical Corps at Gallipoli during the First World War, before going on to become a chemist at the Royal Aircraft Establishment (RAE) at Farnborough.

While his father was engaged on secret projects for the Admiralty during World War Two, David attended St Christopher School in Letchworth, Hertfordshire, where he met Anne, who would become his wife in 1951.

In 1945 David was accepted to study at the Miles Aeronautical Technical School at Woodley in Berkshire, where he received training that would later stand him in good stead as a pilot and aircraft designer and constructor. A period with the Aircraft Design and Engine Test departments of Hawker Siddeley at Coventry only sharpened the young man's desire to become an aviator, and he made arrangements to join the RAF.

Curiously, Sir Ben was reluctant to encourage his son's ambition to fly, and, in need of an approval signature from a responsible adult on

his RAF application, David turned to a member of the Farnborough milieu he had got to know well through his father. Legendary test pilot Capt Eric "Winkle" Brown recalls:

"Sir Ben had apparently refused to put his signature on his son's application, and so David asked me; I was quite happy to do so. It was obvious that this young man had the 'right stuff' — and so it proved".

Having completed his flying training David (in RAF uniform, **LEFT**) was posted to Fassberg in Germany in 1951 with No 118 Sqn, which had reformed in May that year as a front-line fighter-bomber unit equipped with de Havilland Vampire FB.5s. In 1953 David and Anne's first child, Jeremy, was born, the new family shortly thereafter moving back to the UK with David's posting to No 245 Sqn, with which he flew Gloster Meteor F.8s from Horsham St Faith.

While on active service David also found time to undertake specialist courses, qualifying as an Instrument Rating Examiner and a Pilot Attack Instructor.

THE HAWKER YEARS

In 1955 Hawker Aircraft Ltd approached David to become a test pilot — an offer the eternally curious and abundantly talented young flight lieutenant found impossible to refuse, always



OPPOSITE PAGE *The many faces of David Lockspeiser MRAeS CEng, one of Britain's most highly-respected test pilots and engineers. Clockwise from top left: climbing out of the cockpit of Hunter F.6 XE588 after a 1957 demonstration flight in Switzerland; relaxing on the beach at Lloret de Mar, Spain, 1956; flying Hawker Siddeley's Dragon Rapide G-AHGC in September 1955; enjoying a joke with TV presenter William Woollard at Dunstfold in the 1970s; at the controls of his own LDA design; at the wheel of his Elva Austin Formula Junior car in the 1960s.*



ABOVE LEFT In 1955 David was asked to join Hawker Aircraft Ltd as a test pilot, and this portrait was probably taken shortly after he joined the company. **ABOVE RIGHT** David (centre) with his Hawker test pilot colleagues Bill Bedford (left) and Frank Bullen at the SBAC Show at Farnborough in 1956, at which Hawker displayed six Hunters.

having been fascinated by all forms of automotive machinery. He later explained: "Most forms of locomotion interest me and motor racing is high on the list". Unfortunately for David, Hawker didn't share his enthusiasm for the chequered flag and made it clear that his skills were rather too valuable to be jeopardised by messing about in cars. "I participated in Formula Junior, which later became Formula Three, for several years, until the firm for which I was working — I thought with a caution uncharacteristic of our national heritage — put an end to that activity".

Based at Hawker's production airfield at Dunsfold in Surrey, David flew a variety of aircraft, most of his work focusing on the production testing of Sir Sydney Camm's peerless Hawker Hunter. The young test pilot's duties included the testing and delivery of factory-fresh Hunters as well as production development, customer training and demonstration flying. One memorable assignment was a trip to the Far East in 1959 to investigate the cause of a series of mysterious accidents involving Burma's denavalised Sea Furies, David's memoirs of which will appear in a forthcoming issue of *TAH*.

David's work at Dunsfold was plentiful and satisfying, and not only for the test pilot. His nephew, Simon Sanders, remembers being thrilled by some of his uncle's dazzling

impromptu aerobatic routines: "My brother Andrew and I were at boarding school in Sussex. David was my mother's brother and a hero to us. He would fly over our school and treat us to flying displays, performing huge elegant loops, swooping down over the chimney tops and roaring away with sharp, fast rolls. This was the 1950s, when aviation was *really* exciting, and he was in the middle of it. He made the two of us feel that we were in the middle of it too".

In 1956 David and Anne's daughter Rebecca was born, by which time the family had moved to Shalford, near Guildford. For the next dozen years David continued to be a vital part of the Hawker flight test department, while pursuing his other interests — walking, skiing and scuba diving to name a few — with the same enthusiasm he brought to the day job.

FROM TEST PILOT TO DESIGNER

In 1968 David joined the Civil Aviation Division of the British Aircraft Corporation (BAC) as a communications pilot, which enabled him to put numerous type endorsements on his Commercial Pilot's Licence. Noting David's move to BAC, the March 28, 1968, issue of *Flight* had the following to say: "Now that [David] has ceased test flying, Hawker Siddeley and the industry have lost a creative, colourful personality and a pilot of outstanding ability. He is exceptionally experienced in the ground-attack field and his

A typically dynamic photograph by Russell Adams of Hunter F.4 WV325 completing an elegant loop before its delivery to the Central Flying School in 1955. David's nephew Simon Sanders recalls his uncle's thrilling aerobatic displays over his boarding school in Sussex while production testing Hunters from the Hawker airfield at Dunsfold.

TAH ARCHIVE





ABOVE One of David's own photographs taken during the 1957 Hunter sales tour to Switzerland, in which he used Hunter F.6 XE588 to demonstrate the type's impressive ground-attack capabilities. **BELOW** David was a keen motorsport enthusiast and frequently participated in Formula Junior races, like this one at Goodwood in the 1960s.

live-armament demonstrations in Switzerland and Iraq helped considerably in the sales of large numbers of Hunters. He is not only popular in the test-flying world but has also proved to be an excellent ambassador of the country in the many overseas air forces he has visited. His many friends will wish him all success and happiness in the future".

Attached to the fledgling Concorde project at Filton, David flew BAC's HS.125 executive jets and set to work on a project that would become a major preoccupation throughout the 1970s and 1980s, as he later recalled:

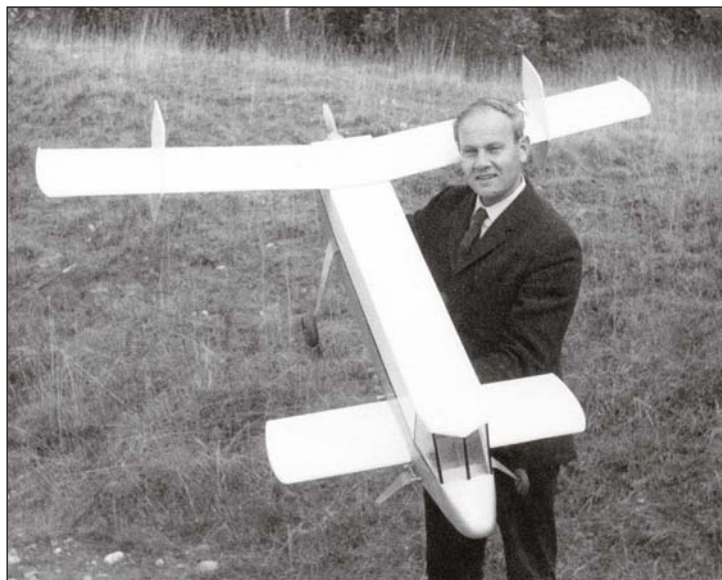
"It was at about this time that my Miles Aeronautical Training School days came into play. Fighter aircraft had always been my main interest until a friend in our flight-test depart-

ment showed me a twin-boom design for agricultural use that he felt the world needed.

"Only too ready to criticise, I told him that in my view it was not the right configuration for that role and what he needed was a very simple aircraft with a large static margin; a wide c.g. [centre of gravity] range. Eventually I thought I had better back up my views with some action, and, with a lot of help from friends, built a 1/10ths-sized proof-of-concept aircraft which I called the Land Development Aircraft 01".

Devised as an "Aerial Land Rover" for use in areas with primitive conditions, the Land Development Aircraft (LDA) was conceived as a rugged, safe, low-cost aircraft which could be adapted for a wide range of tasks and built easily locally. A large part of the concept was





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ABOVE David with a scale model of the ingenious but ill-starred Land Development Aircraft (LDA) he developed at Dunsfold with George Smith. **BELOW** The 1/10ths-scale flying proof-of-concept LDA 01 at the Paris Air Show in 1975. Note how the aircraft is painted in camouflage on the port side and in civil colours on the starboard side.

based on the visits to the developing countries that David had made during his Hunter-delivery days. Much of the engineering work and construction was undertaken by his close friend and colleague George Smith in the Flight Shed at Dunsfold.

CREATING A BUZZ

Of simple construction, the LDA was a single-seat tandem-wing aircraft of canard configuration, the foreplanes being of the same chord as the rear-mounted mainplanes, which were fitted with upper and lower fins and rudders. Powered by a rear-mounted 85 h.p. Continental C85 pusher engine and registered G-AVOR, the experimental scale aircraft made its first flight from the BAC airfield at Wisley on August 24,

1971, with its designer at the controls.

Some 12 flights totalling 5hr 45min were made in the aircraft's original configuration, which resulted in a number of modifications being made. These included the reduction of the mainplane dihedral, extension of the rudders and the fitting of a more powerful 160 h.p. Lycoming engine. By 1975, with the various modifications to the LDA complete, David was ready to give the aircraft its international debut. He takes up the story:

“The first international air display to which I took the LDA, with a view to attracting investment or a commercial manufacturing partner, was in 1975 to the Paris Air Show at Le Bourget. Bendix kindly lent me a nav-comm set with VOR, which was a quantum leap from the ex-Hurricane four-channel set (spare crystals in



MIKE HOOKS



ABOVE With a revised mainwheel arrangement and back in overall civil colours, the LDA 01, registered G-AVOR, is demonstrated by its designer in the summer of 1976. The following year David moved to Singapore to work on upgrades to the nation's Hunters, but he resumed work on the LDA on his return to the UK in the mid-1980s.

overall pocket) which I had acquired for a fiver.

"The spooky part of this story occurred on the Friday, the last commercial day preceding the public days. The normal routine was to have the aircraft on static display, and then to move it away from the stands and nearer to the perimeter track and runway an hour or so before the allotted display time.

"About 10min or so before flying we checked in on the radio to get any changes and start-up time. This had gone like clockwork all week. On the Friday, as I started to walk towards the cockpit, a swarm of bees approached from the other side; the queen bee sat on the rear-view mirror on top of the windscreen arch and in no time the whole cockpit canopy was covered by a huge swarm of bees, making it impossible to get anywhere near the aircraft.

"I missed my chance to fly that day as it took the gallant airfield *pompier*s an hour with honey — which failed — and foam fire extinguishers — which I regret, killed most of them — to remove them. I regret it because those bees saved my bacon. That evening, after the show was over and the crowds had left, we had to take our aircraft over to the military side of the airfield.

"As I motored around the peri-track at a point near the end of the runway, there was a slight dip, at which point the starboard undercarriage leg sheared off. The propeller was broken and the wingtip and aileron were damaged. The failure was the result of a welding fault. The aircraft had to be transported home by road.

"There are many reasons that might prevent

one from flying any given sortie, but having a swarm of bees defending the point of entry is bizarre by any standard. But if they had not settled on the cockpit when they did, I would have taxied out, and, if the leg had not failed on take-off, it certainly would have on landing; a catastrophic disaster. In front of those crowds!"

SINGAPORE AND SARONGS

In 1977 David was engaged under contract as a test pilot for Lockheed Air Services in Singapore to supervise all aspects of the company's fighter flight-test department, which was tasked with a comprehensive upgrade programme for the Republic of Singapore Air Force's Hunters. This included the incorporation of extra wing hardpoints for missiles and a redesign of the cockpit's instrument panel. Realising that the modifications could be adapted for other Hunter upgrade programmes, David acquired the rights to the designs, which were later used by the Royal Jordanian Air Force.

Having developed an abiding love of Singapore, David elected to stay on as an aviation consultant. His nephew Simon remembers visiting him in Singapore:

"He settled in Meyer Road in a large, wonderfully airy studio which he shared with a pair of cats called Pins and Needles. He made a wide circle of friends and adopted the sarong as preferred natty gents' casual wear.

"He loved to visit Malaysia — Tioman Island in particular — where he indulged a passion for scuba diving, and Borneo, where he frequently

went backpacking on Mount Kinabalu”.

This idyllic existence came to an end in 1984 when the studio was demolished to make way for a new housing development, and David decided to come back to the UK to resume work on the LDA, which was given the name Boxer.

David subcontracted Optica Industries at Old Sarum in Wiltshire to produce a production version of the aircraft, the company having acquired the rights to produce the Edgley EA-7 Optica observation aircraft after Edgley Aircraft's financial problems. Unfortunately the Boxer was destroyed in a hangar fire at Old Sarum in January 1987; although all of Optica's aircraft were fully insured, the Boxer was not.

It was the end of the project, but not of David's inexhaustible ideas, on which he continued to work in his drawing office at Birchway, his father's house in Farnborough, where he had moved after the latter's death in 1990. It was at Birchway that David pursued his many and varied interests; his beloved Lotus Elite was joined by an Austin Seven and he filled his time

with travelling, skiing and his many friends. As his nephew Simon explains:

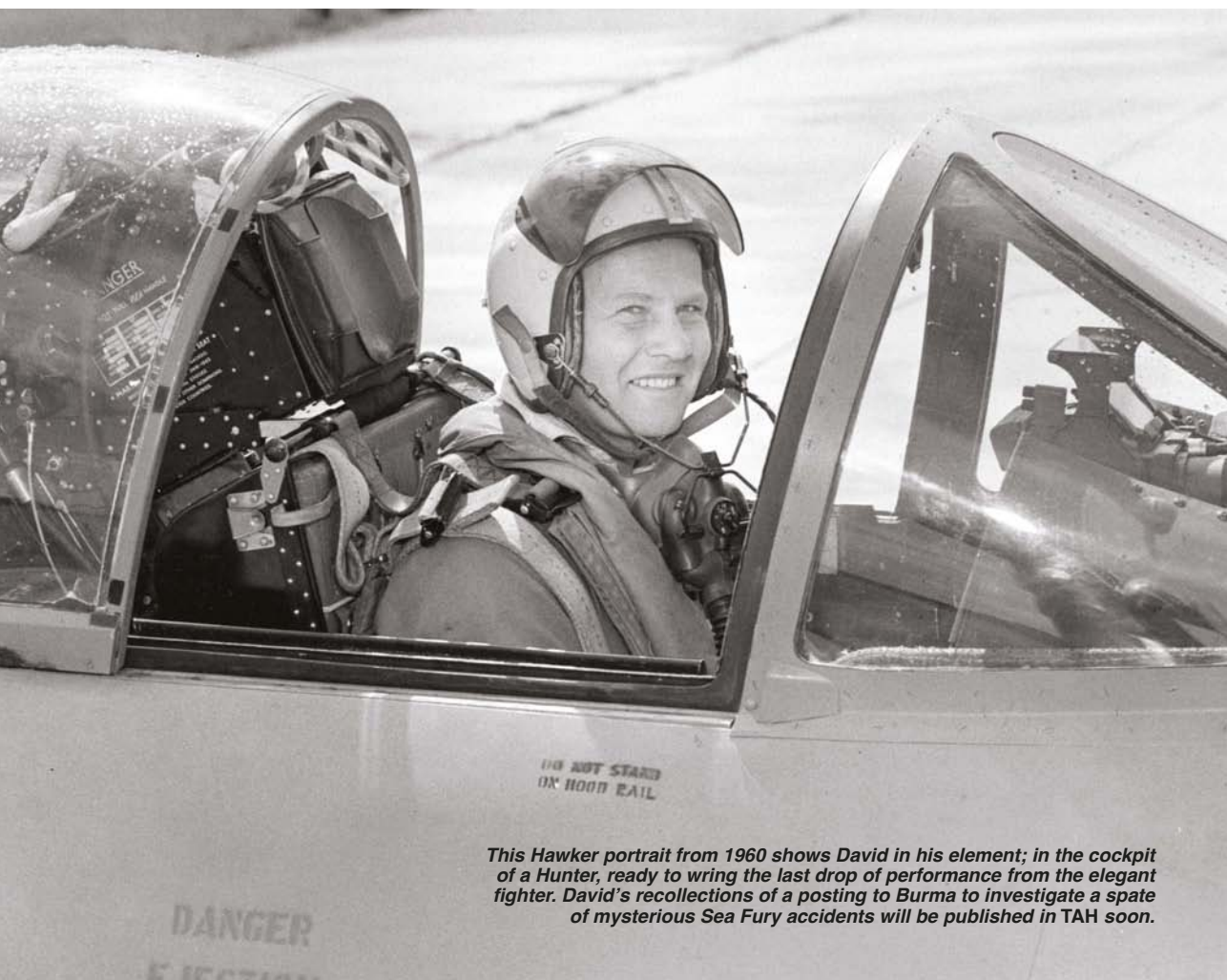
“In typical David style, he was working on the design of a new aeroplane right up until the last few weeks of his life. That was my hero uncle, who I will forever remember cleaving the sky above my boarding school with his Hunter”.

It is appropriate, however, that the last word should go to the man himself, one of British aviation's great all-rounders and a pilot and engineer of outstanding ability:

“From the age of four what I always wanted to do above all else was to fly. Later, this was not considered worthy of being called an ambition and a lot of pressure was applied to dissuade me — I'm sure they were right — but I count myself most fortunate in having been able to do what meant most to me”.



ACKNOWLEDGMENTS The Editor would like to thank Jerry and Beccy Lockspeiser, Simon Sanders and Ken and Jean Fostekew of the Museum of Berkshire Aviation for their invaluable help with this tribute.



This Hawker portrait from 1960 shows David in his element; in the cockpit of a Hunter, ready to wring the last drop of performance from the elegant fighter. David's recollections of a posting to Burma to investigate a spate of mysterious Sea Fury accidents will be published in TAH soon.



FMA IA-58A Pucará ZD485, formerly A-515 with the Fuerza Aérea Argentina, with which it served during the Falklands conflict, up from Boscombe Down on June 17, 1983. The manoeuvrable ground-attack aircraft retained its Argentinian camouflage but had RAF roundels and fin flashes applied for its A&AEE evaluation.

ADRIAN M. BALCH COLLECTION

flying the ***pucará*** ***the BOSCOMBE DOWN verdict***

Argentina's IA-58 Pucará is one of the more unusual aircraft to have flown in British military markings during the post-war period, and the type's evaluation at Boscombe Down in the aftermath of the Falklands conflict offered fascinating insights into what had initially been a feared adversary. **BEN DUNNELL** talks to the team tasked with investigating the capabilities of this intriguing but ultimately disappointing war prize

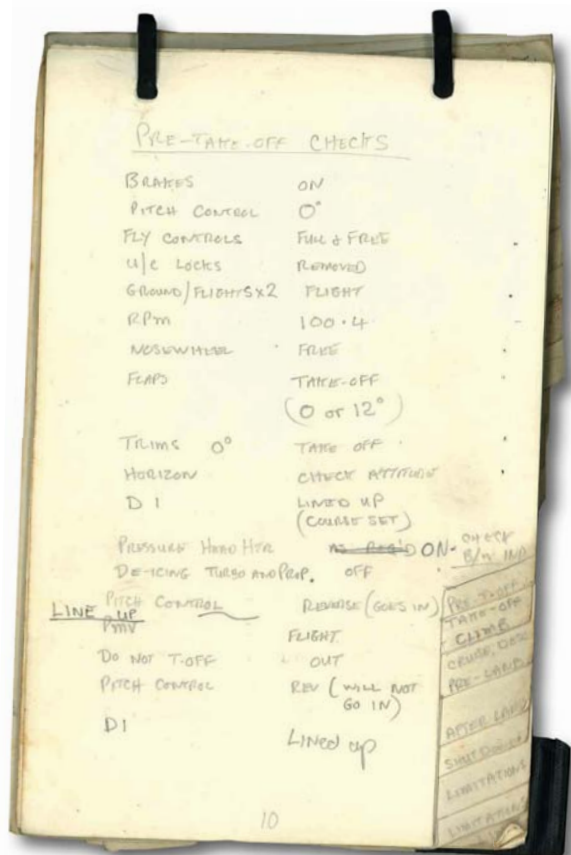
EVALUATING ENEMY AIRCRAFT: something Britain did a lot of in World War Two of course, but not so much afterwards. One feels there might be much still to emerge regarding potential exploitation of Warsaw Pact types, but that is a subject for another day. The last time it happened with public knowledge was in 1983, when, in the aftermath of the Falklands conflict, a formerly feared weapon of the *Fuerza Aérea Argentina* (FAA — Argentinian Air Force) was put through its paces. The results, according to one of the test pilots who flew it, forced something of a reassessment. The FMA IA-58 Pucará ("Fortress" in the native South American Quechuan language) wasn't nearly the threat it had initially been considered.

Why the Aeroplane & Armament Experimental Establishment (A&AEE — Aircraft & Armament Evaluation Establishment since 1992) at Boscombe Down came to fly an example of the Argentinian-built twin-turboprop ground-attack aircraft was, of course, related to the Falklands campaign. The opportunity presented by the capturing of an intact Pucará was deemed too good to miss, especially given the risk of further potential South Atlantic conflict. Finding a suitable airframe was another matter.

For many years the Technical Intelligence (Air) Department at the Ministry of Defence (MoD) had busied itself investigating the latest in Soviet military aircraft technology. In 1982 the Falklands conflict took its research down a different avenue. Wing Commander John Davis, whose RAF career had already seen him flying Canberras, graduating from the Empire Test Pilots' School and serving as deputy superintendent of the A&AEE, was at the time working in Technical Intelligence — specifically, he says, "looking at new Soviet aeroplanes. But with tension building up as far as the Falklands were concerned we then became responsible for technical information on the Argentinian Air Force. In fact we produced a lot of the visual aids that were used by the task force, and, in conjunction with our colleague branch at the MoD responsible for orders of battle, assessed what the intelligence was".

ACQUIRING AN AIRFRAME

The work that led to a Pucará flying in Britain began after the Falklands conflict ceasefire on June 14, 1982. "My boss told me to go down to the Falklands", says John, "and I took with me an armament specialist and a radar specialist. Our idea was to look at all the technical intelligence, look at as many of the crashed aeroplanes as possible to see what kit they had, look at all the ground side, look at the armament side — for



ABOVE A page detailing pre-take-off checks for the Pucará from Sqn Ldr Russell Peart's handwritten flight reference cards for the aircraft, prepared from limited official technical information and fairly minimal experience in March 1983. The cards are now kept in the archives of the Royal Air Force Museum at Hendon, and the aircraft is at RAF Museum Cosford.

example the Exocets that were on the island — and send home as much kit as we thought would be useful."

Getting there by RAF Hercules was itself an adventure. The small team from Technical Intelligence (Air) went down on only the second flight into Stanley after fighting had finished, the Governor of the Falkland Islands, Rex Hunt, having been on the first. "We did three lots of [air-to-air] refuelling on the way down", John recalls, "and there was no radar on the island, so we had three goes at getting our Hercules in. If not, we would have gone straight back to Ascension. One or two aeroplanes did that, with about a 24hr round trip. However, we got in". The scene that greeted them was hardly the most welcoming: "It was very bleak, it was snowy, it was the winter. And it was knee-deep in Argentinian ammunition, exploded or unexploded. The place was absolutely filthy. There were mines everywhere.

"When we initially arrived, we commandeered



ABOVE Pucará A-515 was the best airframe found on the Falklands after the ceasefire in June 1982, and is seen here being inspected at Stanley Airport by British forces including members of the Ministry of Defence's Technical Intelligence (Air) Department, sent over from London. Note that the serial number was not applied to the port side.

a helicopter to visit all the sites at which Pucará and other Argentinian aeroplanes had been based, to glean what intelligence we could. Because we were still officially at war with Argentina, our bosses wanted an assessment of the aeroplane with regard to how we would be able to counter it. In that respect, one of the jobs we had to try and do was find out all the technical details. We went to every base, and we discovered between us that we could find no technical information at any of the sites at which Pucará had been based [Stanley Airport plus grass strips at Goose Green and Pebble Island]. This surprised us. We looked carefully to see if things had been burned, shredded or otherwise, but we could find nothing. It transpired that the

reason for this was that major servicing was done on the mainland — all they did on the Islands was, if you like, the first-line work; filling up with fuel and ammunition and flying."

The main cache of Pucará was located at Stanley Airport, renamed *Base Aérea Militar* (BAM) Malvinas by the Argentinians. When the aircraft were found, Argentinian soldiers were found sleeping in some of the airframes, taking advantage of the space inside the fuselage. Indeed, it was possible to carry an engineer in there. It is said that some rather less pleasant remnants of these temporary living quarters were left behind, too . . .

"In looking at all of them, we found only one that was whole," says John Davis. "All the rest

Royal Navy Sea Harrier pilot David Morgan strikes a pose at the Pucará graveyard at Stanley Airport. Morgan was an RAF Harrier pilot who was on an exchange programme to learn to fly the Sea Harrier when the Falklands conflict began. He later shot down four Argentinian aircraft and flew a Sea Harrier against the Pucará during its evaluation in the UK.

DAVID MORGAN VIA AUTHOR





ABOVE With its British military serial ZD485 applied and wearing RAF roundels and fin-flashes, the Pucará was demonstrated at the Empire Test Pilots' School open-day held at Boscombe Down on June 11, 1983. Eagle-eyed observers will notice that the nosewheel door carries the last two digits of its original Argentinian serial, A-515.

had been sabotaged by the SAS at some time beforehand. We commandeered this one, plus two 'Christmas tree' aeroplanes". The complete example was serialised A-515 (see panel below), which still had underwing rocket pods fitted, while the airframes earmarked for spares use were A-533 and A-549.

RETURN TO AIRWORTHINESS

On July 10, 1982, exactly a month after the last Pucará mission of hostilities, RAF Chinook HC.1 ZA707 airlifted A-515 to the *SS Atlantic Causeway* conveyor ship, which took the airframe on a 15-day sea voyage from Port William to Devonport dockyard in Plymouth. There it arrived on July 27, soon to be moved by road to

Boscombe Down, ready for a return to the skies.

Owing in part to the aforementioned lack of technical information, this was not the work of a moment. However, John Davis and his Technical Intelligence (Air) colleagues had much to offer. Several times in previous years FMA had exhibited the Pucará at the Farnborough and Paris airshows. From a Le Bourget visit had been brought back to the MoD what John calls "a fair drawer-full of technical information, which we gave to Boscombe Down. It certainly helped them; I wouldn't say it was the be-all and end-all, but it certainly assisted in getting the aeroplane serviceable."

"It needed a huge amount of restoration", adds Sqn Ldr Tony Banfield, then a test pilot on

DOWN BUT NOT OUT — FMA IA-58A PUCARÁ serial A-515

PUCARÁ A-515 (c/n 018) was delivered to the *Fuerza Aérea Argentina* by its manufacturer, *Fabrica Militar de Aviones* (FMA), during 1975. It was built as part of an export batch intended for, but not delivered to, Mauritania. *Grupo 3 de Ataque*, part of *III Brigada Aérea*, received the Pucará at *Base Aérea Militar* (BAM) Reconquista in the province of Santa Fé, and used it on operations against guerrilla groups in north-west Argentina. Further action was not long in coming.

In late May 1982 A-515 was deployed to Port Stanley in the Falkland Islands as part of post-invasion reinforcements and attrition replacements. It had been, says the RAF Museum, repainted "using Fiat car paint" in a largely tan-and-light-green scheme. Before leaving for "las Malvinas" it had performed armed-reconnaissance sorties over the Argentinian mainland coast as a deterrent to potential British special-forces attacks. Now it would get to take on the British face-to-face.

Among the missions known to have been flown by A-515 is the final Pucará sortie of the war, a three-aircraft effort against British artillery positions and troops on East Falkland, specifically the northern side of Mount Kent and Murrell Ridge. Flown by Lt Morales, A-515 was hit by small-arms fire on June 10, 1982. Four days later, Argentinian forces surrendered.

All 24 Pucarás operated in the Falklands had either been destroyed or were now captured by the British. For A-515, it was the beginning of a new chapter. **BD**

THE HISTORY OF IA-58 Pucará A-515/ZD485 is covered in depth in a downloadable document by Andrew Simpson, which is available on the RAF Museum website at www.rafmuseum.org.uk.



ABOVE On April 28, 1983, Sqn Ldrs Russ Peart (front cockpit) and Tony Banfield took the Pucará for its first flight after its reassembly in the UK. Despite the ground-attack and counter-insurgency aircraft's reputation as an agile and effective performer at low level, the evaluation team found the type to be something of an under-achiever.

B Squadron of the A&AEE. The multi-engine expertise of Banfield — a former Vickers Valiant and Handley Page Victor captain, and a hugely experienced RAF instructor — would be brought to bear during the evaluation of the Pucará. First, though, came its return to airworthiness. "They brought it back as deck cargo", Tony recalls, "so it had got a lot of salt in it. The A&AEE trials engineers, and there were some very clever people there, virtually took it apart". Some of what they found said little for the levels of maintenance undertaken by the aircraft's original operator. It is reported that inspections at Boscombe Down showed the Martin-Baker ejection seats not to have been removed for servicing since the day they were installed. The drogue chutes had been rotted through by ultraviolet rays, rendering them unserviceable.

At least the Turboméca Astazou turboprop engines were well-known from use on the RAF's Scottish Aviation Jetstreams, but much else was not. "One of the big problems was getting tyres and wheels for it", says Tony Banfield. Those on the "Christmas tree" airframes had been left too badly damaged. "Eventually I think it was Beagle Basset wheels that we used."

While that work was ongoing, Sqn Ldr Russell Peart of the A&AEE's A Squadron was — with, no doubt, substantial help from the manufacturer's information provided by Technical Intelligence (Air) — making his own preparations. In March 1983 he handwrote the Pucará's flight reference cards, which are today held by the RAF Museum. For the purposes of the Boscombe trials, the aircraft would be limited

to a maximum speed of 350kt; for inverted flight 160kt was the limit, while 150kt with the undercarriage down and 140kt with flaps were other speed restrictions.

A maximum of 3.5g was imposed for initial flights, later increased to 5g, while the aircraft's negative-g limit was -1.5. No more than 30sec of continual negative-g flight were to be made. Stall entry was to take place no lower than 10,000ft (3,050m), and stalls discontinued by 7,000ft (2,130m). Aerobatic manoeuvres permitted were rolls, loops, stall turns and Immelmans, spins being prohibited.

INTO RAF ROUNDELS

Pucará A-515 was allocated the British military serial ZD485, this being applied, along with RAF roundels, atop the basic Argentinian camouflage scheme in which it had been found at Stanley. Spares aircraft A-533 and A-549 were also given British serials, ZD487 and ZD486 respectively, although these were never worn by either airframe. They provided several parts for the restoration of A-515/ZD485, which progressed well enough in six months to allow taxiing trials on February 22, 1983. The thought of an unfamiliar aircraft going on to the UK military register, being put through an extensive restoration and all but readied for flight in such a short space of time would probably give the airworthiness bureaucrats at today's risk-averse Military Aviation Authority convulsions. Those were very different times.

Russ Peart took the Pucará for its first test flight from Boscombe Down on April 28, 1983,

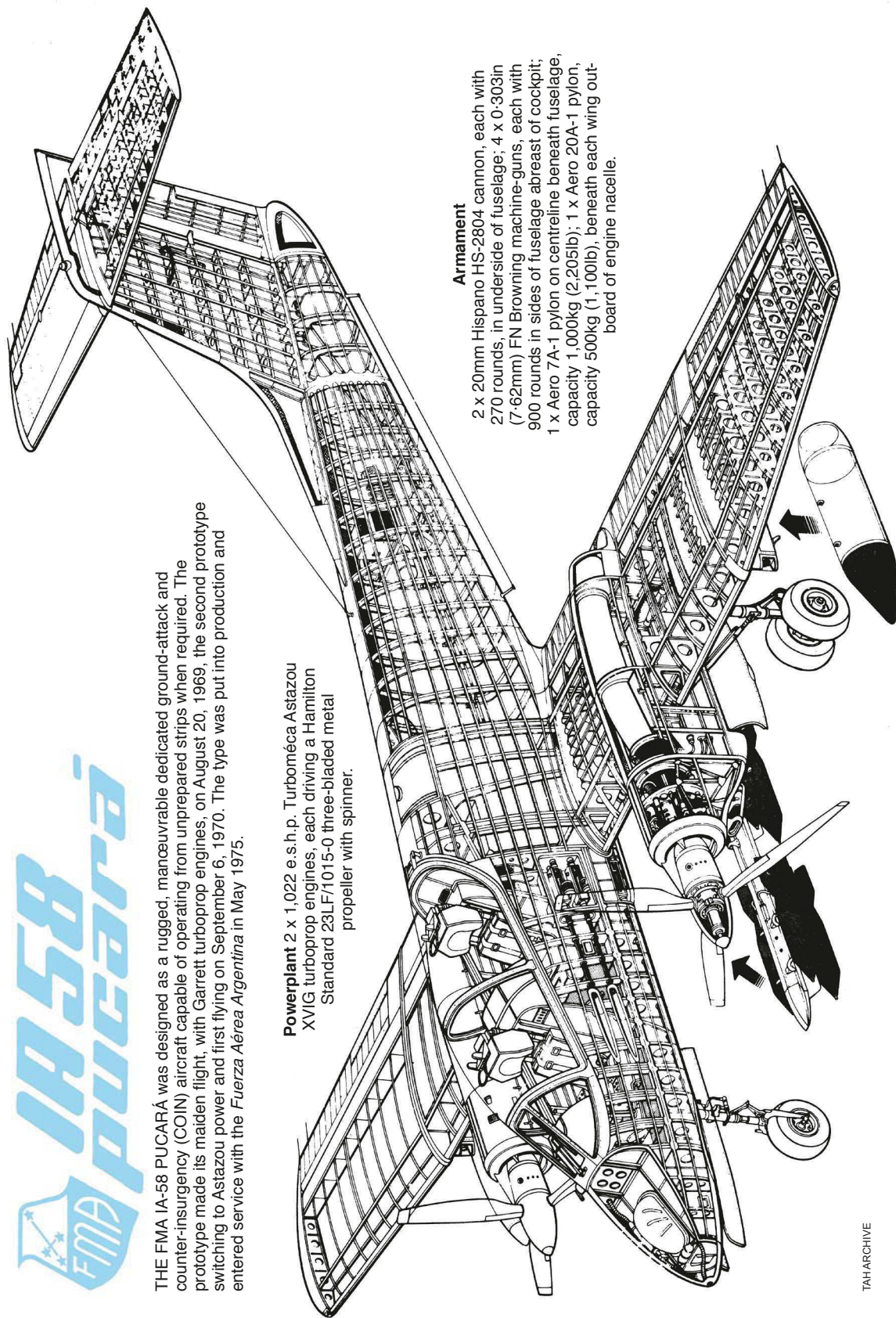


THE FMA IA-58 PUCARÁ was designed as a rugged, manoeuvrable dedicated ground-attack and counter-insurgency (COIN) aircraft capable of operating from unprepared strips when required. The prototype made its maiden flight, with Garrett turboprop engines, on August 20, 1969, the second prototype switching to Astazou power and first flying on September 6, 1970. The type was put into production and entered service with the *Fuerza Aérea Argentina* in May 1975.

Powerplant 2 x 1,022 e.s.h.p. Turboméca Astazou XVIG turboprop engines, each driving a Hamilton Standard 23LF1015-0 three-bladed metal propeller with spinner.

Armament

2 x 20mm Hispano HS-2804 cannon, each with 270 rounds, in underside of fuselage; 4 x 0.303in (7.62mm) FN Browning machine-guns, each with 900 rounds in sides of fuselage abreast of cockpit; 1 x Aero 7A-1 pylon on centreline beneath fuselage, capacity 1,000kg (2,205lb); 1 x Aero 20A-1 pylon, capacity 500kg (1,100lb), beneath each wing outboard of engine nacelle.



with Tony Banfield in the back seat. Thus ensued the A&AEE's limited trials and handling assessment. Being a ground-attack expert, Peart led the way when it came to evaluating that aspect of the aircraft's performance, albeit without it being heavily laden, while Banfield examined its survivability. To that end, Tony undertook his first sorties as the pilot of the Pucará on May 9, performing asymmetric engine work and relights. With that, he reports, "there was no problem at all", helped by the large, power-assisted rudder. But what was his view of how it would have fared in combat? "It wouldn't have stood a chance against a Rapier [surface-to-air missile]", Tony says. "The Pucará's reputation was fearsome, but it was never put to the test". Such can be deduced from its underwhelming record in the Falklands campaign, during which significant numbers were destroyed on the ground: three at Goose Green by Sea Harriers, and six at Pebble Island by the SAS.

Given the aircraft's other limitations, Tony Banfield believes the pilots of those wrecked machines were lucky to get taken out of the fight. "We did a lot of radar simulation work", he told the author, "and we discovered that the radar returns from those huge turboprop propellers, together with the sound that they made in warning of their approach, meant that against Rapiers it would have been like a pheasant shoot". This much was gleaned from numerous sorties in which the Argentinian aircraft's combat capabilities were put to the test, not least over the Larkhill ranges on Salisbury Plain; and, on June 23, 1983, simulated attacks against a Rapier battery.

"MORE OR LESS USELESS . . ."

In all, Tony flew 7hr 10min in the Pucará, 4hr 40min of that time as captain; it was an interesting diversion from the Hawker Siddeley Nimrod AEW.3 testing he was doing at the same time. "It was a fun aircraft to fly — a splendid aerobatic aircraft", he says of the IA-58. "If you were doing a stall-turn you could virtually do a cartwheel if you chopped the inboard engine, like Jan Zurakowski used to do in the Meteor. I could never get all the way round, though.

"In respect of carrying out its task, it was more or less useless. Although it was very heavily armed, and everyone feared it, when you put it in the dive the trim-change as speed increased was enormous. In order to hold it you had to trim, and you had to take your hand off the throttle to do that, so you couldn't do your radar-ranging and things like that. In addition, as speed increased the controls became heavier and heavier and heavier, and you virtually had

Continued on page 28

PUCARÁ IN THE FALKLANDS: THE ARGENTINIAN PERSPECTIVE

IN NOVEMBER 1982, five months after the end of the Falklands conflict, **MICHAEL O'LEARY** visited Argentina to conduct interviews with FAA veterans of the Malvinas Campaign, including two Pucará pilots of Grupo 3 de Ataque, part of III Brigada Aérea, based at BAM Reconquista in north-eastern Argentina at the time of the interviews.

Premier Teniente Juan Luis Micheloud

"May 21, 1982 — Mayor Juan Carlos Tomba [in Pucará serial A-511] and I were flying a two-aircraft sortie near San Carlos strait when suddenly we saw three [Sea] Harriers flying above us. Two came down to attack — we were very low at the time. Tomba and I broke left and right, hugging the earth, and both Harriers decided to come after me. I flew even lower and headed into a canyon. The two fighters tried to box me in but the terrain prevented them from hitting me, so they pitched up out of the fight and the third Harrier had a go. By this time both Tomba and I were flying around the terrain trying to give each other mutual support; it must have worked as the third Harrier couldn't hit me either.

"The other two Harriers attacked Tomba, making two passes at him. On the first pass Tomba could see the impact of the 30mm cannon on his port wing — the rounds were punching holes in the skin. Tomba saw the Harrier break away upwards and into a second pass. This time, when the Pucará was hit, the starboard wing was almost cut in half by the 30mm fire and Tomba ejected. He came down by parachute near Goose Green, which was in our hands, so he was rescued by our own people.

"We lost many Pucarás on the ground, and by the end of the war had only eight intact, with maybe only two of those really capable of flying combat sorties. One aircraft, flown by *Teniente* Miguel Angel Gimenez, was lost on May 28 to a missile, but we have no idea what happened. Regarding anti-aircraft fire, our worst threat was the [Shorts] Blowpipe [surface-to-air missile], because we couldn't see it, but it could see us owing to our heat signature, and we were very close to the troops firing them. Sometimes our aircraft would return to base heavily punctured but still in one piece. The Pucará turned out to be quite resilient. Since we had two engines, we often returned with one shot out. But the Blowpipe would always destroy enough of the controls to make the aircraft unflyable.

"We saw Harriers continually but we were always extremely low and in poor visibility at very high speed. We would only see them briefly and that was it. Mayor Tomba was the only pilot downed by Harriers. Personally I did not think it was difficult to see the Harriers because they were very dark against the sky. The Sea Harriers, with their grey paint, were



ABOVE Pucará A-567 photographed by MICHAEL O'LEARY while up from BAM Reconquista in November 1982. This was one of 14 new Pucarás received by Grupo 3 de Ataque in 1982 as replacements for those lost in the Falklands conflict, and remained in service until 2002. The long-serving Pucará still operates with the FAA today.

more difficult to see than the RAF Harriers.

"We usually operated over our own anti-aircraft artillery in the Malvinas, which gave us a degree of defensive cover. We lost all 24 of our Pucarás in the Malvinas, five of these in aerial combat. They were lost to the following: Blowpipe — 3; Harrier — 1; MIA — 1; Take-off accident — 1.

Capitán Ricardo A. Grünert

"The dense concentration of automatic anti-aircraft fire was very hard for the Pucará to take, although it held together and got us home. We found that the electronic firing system also gave us problems, with poor micro-switches and the electrical system in general. The humidity was too high and the cold weather was very hard on the aircraft. We didn't consider mounting Sidewinders on the Pucará because our unit had never really trained for air-to-air combat, which would have meant equipping the aircraft with radar. An anti-ship missile would have been fine.

"I would say that around 80 per cent of the operational Pucará flying during the conflict was from unprepared dirt or grass runways, and operating under very marginal weather conditions. These strips were about 450m long [1,475ft] by 450m wide. With the constant bombardment, rain and landing of troops, we were constantly on the go. The runway itself was around 450m long and about 6–7m [20–23ft] wide, but we could usually get in and out within 365m [1,200ft] fully loaded [1,360kg/3,000lb] with bombs and rockets.

"One of our major problems was the wheels sinking into soft ground. Goose Green was the only airfield where we could operate with no problems to speak of; there was good drainage so the water could run off. At times we could not take off and that helped the British. Also, our aircraft were all lined up and often could not

leave — easy pickings for the Harriers. We often used the rockets of unserviceable aircraft as artillery. The 7-62mm [0-3in] machine-guns and 20mm cannon from our unserviceable aircraft were used against the Harriers that would come over the end of the runway — we are sure we hit one.

"We never attacked ships; the closest we got to them was during reconnaissance missions. We made some attacks on artillery areas but we have no record of what, if any, damage, was caused. We fired rockets at about 1,500–2,000m [5,000–6,500ft]. This was at Mount Kent and we launched the rockets to hit the artillery over the hills. The Pucará turned out to have exceptional qualities for low-level flight in combat. We normally flew in the worst weather and under very low ceilings, when the Harriers could not fly — this gave us a much-needed extra margin for survival. I am sure the enemy felt the effects of this, and that this factor determined, to some degree, their ability to move against us.

"The Pucará was able to take a great deal of damage. Of the total of 44 days that we were in combat, we only lost two pilots despite being under continual bombardment. Practically all of the Pucarás were hit by small-arms fire in one way or another, but kept flying. One Pucará was hit in the canopy, aileron and tail, yet still flew the next mission. Another came in with hits all over the engines, one of which had its prop feathered. A rudder had a big hole in it, so we repaired it by hand and then sent the aircraft on its next mission.

"We had a sizeable store of parts, and we would strip the aircraft that could no longer fly of radio equipment, everything that we could use. We found the Pucará excellent against rotary-wing aircraft. Our four 7-62mm machine-guns and two 20mm cannon were very effective against the British helicopters."





A pair of Sea Harriers of No 899 Naval Air Squadron bristle with AIM-9L Sidewinders while up from Yeovilton. The nearest, XZ457, took part in the Falklands conflict and accounted for four kills. In 1983 David Morgan flew an 899 NAS Sea Harrier in trials against the Pucará.

TAH ARCHIVE

to use two hands on the stick to move the ailerons, so actually aiming the thing was very difficult. It wasn't 'fit for purpose'."

Keeping an eye on the flight assessment of the Pucará, given that it was being conducted on behalf of Technical Intelligence (Air), was John Davis. On June 10, 1983, he flew in the aircraft for a 40min trip with Russ Peart, focusing largely on take-offs and landings, and naturally took the stick himself. "Interesting aeroplane", says John. "Quite easy to fly, relatively good controls, but got very, very heavy as the speed increased — it was similar in that respect to an early-mark Canberra. But, generally speaking, quite pleasant, with lots of room in the cockpit. We did both hard and grass runway operations at Boscombe; it's very rugged."

Russ Peart was at the controls when the Pucará

was put up against a variety of British military aircraft types for simulated combat trials.

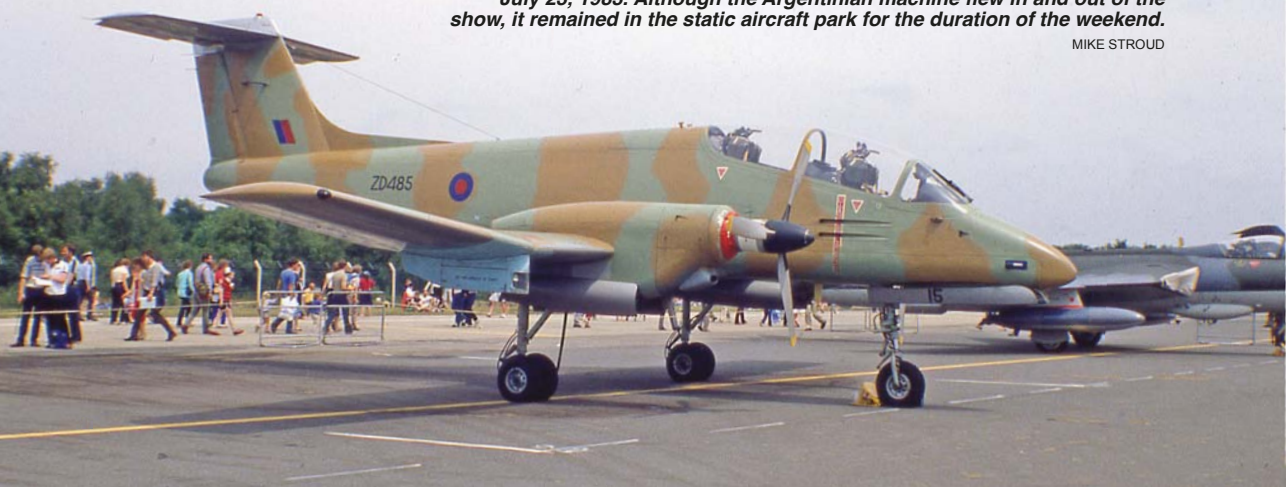
Records at the RAF Museum show that "1-v-1" combats with Westland Puma and Sea King helicopters took place on June 27–28, 1983, followed by fighter affiliation versus two McDonnell Douglas Phantoms on July 12. The results have yet to be made publicly available.

AIR-TO-AIR COMBAT TRIALS

Testimony from another sortie is on hand thanks to Lt-Cdr David Morgan DSC, the RAF Harrier GR.3 pilot (then a flight lieutenant) who transferred on exchange to the Royal Navy's Sea Harrier FRS.1 force shortly before the Falklands conflict, and went on to score two helicopter and two A-4 Skyhawk kills. On July 18, 1983, in an engagement decidedly reminiscent of some

The Pucará at the International Air Tattoo at RAF Greenham Common on July 23, 1983. Although the Argentinian machine flew in and out of the show, it remained in the static aircraft park for the duration of the weekend.

MIKE STROUD





ABOVE Despite British curiosity about the Falklands war prize, the Pucará made only two appearances at public airshows during its A&EE evaluation; one was at RNAS Yeovilton on July 11, 1983, and the other was at the International Air Tattoo at Greenham Common two weeks later, where it is seen here making a pass on arrival.

conducted during the previous year's conflict but this time staged between Boscombe Down and Yeovilton, he flew his No 899 Naval Air Squadron Sea Harrier, XZ459, against the Argentinian aircraft.

"We got a call from Handling Squadron at Boscombe Down, asking if we could spare a Sea Harrier or two to come and do some work with the Pucará", David says. "Basically, we were looking at pick-up ranges, manoeuvrability and what the missile would do against the turboprop engines in manoeuvre; that sort of thing. We started with some intercepts to check the radar cross-section — off the top of my head, we were doing about 25–30-mile [40–50km] splits, and then coming in from various angles: 180° out, 150° out and so on, just recording the maximum pick-up ranges and the size of the radar contact, which was actually quite huge, I suspect from the big props. We were certainly getting very good pick-up ranges, way outside the normal fighter-size target."

Then came some air combat manoeuvring. "It was set up so that the Pucará was evading and I was trying to take as many shots as I could. Initially I did what every good fighter pilot should do — keep the energy up, keep the speed up and just make slashing attacks, get a missile lock and then break off, go high, reposition and drop in for another one. I was actually pursuing the attack further than I normally would have done, because you'd normally take the missile shot and then pull off straight away, but I was recording it in the HUD [head-up display] right through to when I estimated missile impact



ABOVE Although of poor quality, this is a unique photograph; it shows the ghostly image of the Pucará through the head-up display of David Morgan's Sea Harrier, XZ459 (itself a veteran of Operation Corporate, the Falklands campaign), during the comprehensive air combat trial undertaken on July 18, 1983.

would be, to see how many angles the Pucará could get on me. It was quite a lot — they were getting about 150° out, so about 330° of turn by the time the missile would have hit, but it was staying locked the whole time, so there was no problem with that.

“Right at the end, when we were getting a little bit low on gas, I thought, ‘OK, I’ll do what I shouldn’t do’: drop the flaps, slow the aircraft right down and try and match the turn and get a guns kill. It became rapidly obvious that he was out-turning me considerably, so I then slammed the nozzles aft and pulled the nose up to try and get out of the way. From what I remember, he said he might just have got a guns shot at me, because I couldn’t get out of the way quick enough. It was a classic case: if you try and go slow with a low-wing loading aircraft, he’s going to be biting your arse fairly quickly.”

That flight was almost the last of the Pucará evaluation. Three days later, a performance assessment was carried out en route to RAF Greenham Common, where ZD485 appeared on static display at the following weekend’s International Air Tattoo. It then flew back to Boscombe. About 25 flying hours had been expended on the trial, but the aircraft had been serviced on the basis of a 50-flying-hour programme, the original estimate made by Technical Intelligence (Air). “We had an aeroplane there, serviceable, and pilots who could fly it”, says John Davis. “My thought was to offer it to the RAF so that, in the summer of 1983, it and a Harrier could fly around all the

RAF open days and ‘At Home’ days to show the Harrier and the Pucará side by side. This was rejected at a very high level by the Ministry of Defence, on the basis that they couldn’t afford it. So, what we ended up doing was filling it up with every litre of fuel possible, planning a cross-country round every unit in the south of England, and dropping it off at Cosford.”

FROM EVALUATION TO EXHIBITION

That took place on September 9, 1983. It became part of the then RAF Aerospace Museum collection, today Royal Air Force Museum Cosford, and remains there to this day. For a time it was joined by the incomplete airframe of Pucará A-528, which has since gone to the Norfolk & Suffolk Aviation Museum at Flixton. Of the two airframes used for spares, A-533 was scrapped after some years on display at Middle Wallop’s Museum of Army Flying, only the nose being kept by the Boscombe Down Aviation Collection at Old Sarum, while A-549 may be seen at IWM Duxford. Visitors to Cosford will note that A-515 has been put back into its original camouflage scheme, as worn during pre-Falklands service. While authentic, it is, to some extent, a pity that no outward trace remains of its British military colours.

Now an ageing design but subject to upgrades, the Pucará remains in service with the air forces of Argentina and Uruguay. Despite occasional bouts of Argentinian sabre-rattling over the Falklands, it must be said that the capabilities of the Fuerza Aérea Argentina in terms of equipment have increased little since the 1982 conflict.



ABOVE The Pucará at the RAF Cosford Aerospace Museum (now RAF Museum Cosford), where it was delivered in September 1983. It retained its RAF roundels and fin flashes for some time, but was later repainted in its original Argentinian markings and pre-Falklands light camouflage. In 1995 it was allocated Maintenance Serial 9245M.



ABOVE The Pucará continues to soldier on with the Argentinian and Uruguayan air forces, and there are plans to modernise those still on the former's inventory with 950 s.h.p. Pratt & Whitney Canada PT6A turboprops, to create the IA-58D "Super Pucará". The Sri Lankan Air Force also used the type in the nation's civil war during 1993–99.

Tony Banfield offers a postscript: "Russ Peart and I were at Farnborough [for the SBAC show] some years later — we were all friends with the Argentinians again, more or less, and they had a stand there. We started chatting to them, and of course told them we'd flown the Pucará. They were delighted to talk to us because they wanted to get the RAF test pilots' impressions, which we gave them".

Whether those faults have been acted upon, one can only speculate. The idea of turboprop-powered aircraft being used for counter-insurgency missions has enjoyed a new vogue in recent times, yet no direct successor to the Pucará appears in sight. Argentina's remaining 30 in-service examples are set to be updated, according to a November 2011 contract, with new Pratt & Whitney Canada PT6A-62 engines to replace the old Astazous, so it remains committed to the indigenous design. Uruguay, which has made its Pucarás compatible with the use of night-vision equipment, may do likewise.

Never has the RAF sought to acquire a similar type of aircraft, preferring such work to be done by fast jets. But the experience gained with the Pucará in 1983 was of technical value, and an interesting footnote in the A&AEE's history and the careers of those who got to fly it.



ACKNOWLEDGEMENTS As well as those interviewed, the author would like to thank Denis J. Calvert and Santiago Rivas for their assistance. The Aviation Historian would like to thank Michael O'Leary and the RAF Museum's Peter Elliott.

FMA IA-58A PUCARÁ data

Dimensions

Span	47ft 6¾in	(14.5m)
Length	46ft 9in	(14.25m)
Height	17ft 7in	(5.36m)
Wing area	326.1ft²	(30.3m²)
Wing chord at root	7ft 4¼in	(2.24m)
Wing chord at tip	5ft 3in	(1.6m)
Wing aspect ratio	6.95:1	
Wheel track	13ft 9¼in	(4.2m)
Wheelbase	11ft 5in	(3.48m)

Weights

Empty, equipped	8,900lb	(4,037kg)
Maximum take-off	14,991lb	(6,800kg)
Maximum landing	12,800lb	(5,806kg)

Performance

Max level speed at 9,850ft (3,000m)	310 m.p.h.	(500km/h)
Cruise speed at 19,680ft (6,000m)	298 m.p.h.	(480km/h)
Stall speed with flaps and under-carriage down	89 m.p.h.	(143km/h)
Climb at sea level	3,540ft/min	(1,080m/min)
Service ceiling	33,000ft	(10,000m)
Range with max fuel at 16,400ft (5,000m)	1,890 miles	(3,042km)

PEMBERTON BILLING

and the

Four-Winged Farrago

When bombing raids on British cities by German Zeppelin airships began in early 1915, Supermarine's eccentric founder Noel Pemberton Billing — "PB" — proposed a heavily-armed twin-engined quadruplane nightfighter. **MICHAEL H. GOODALL** uses previously unpublished documents to tell the full story of PB's ungainly World War One "Battle Planes"

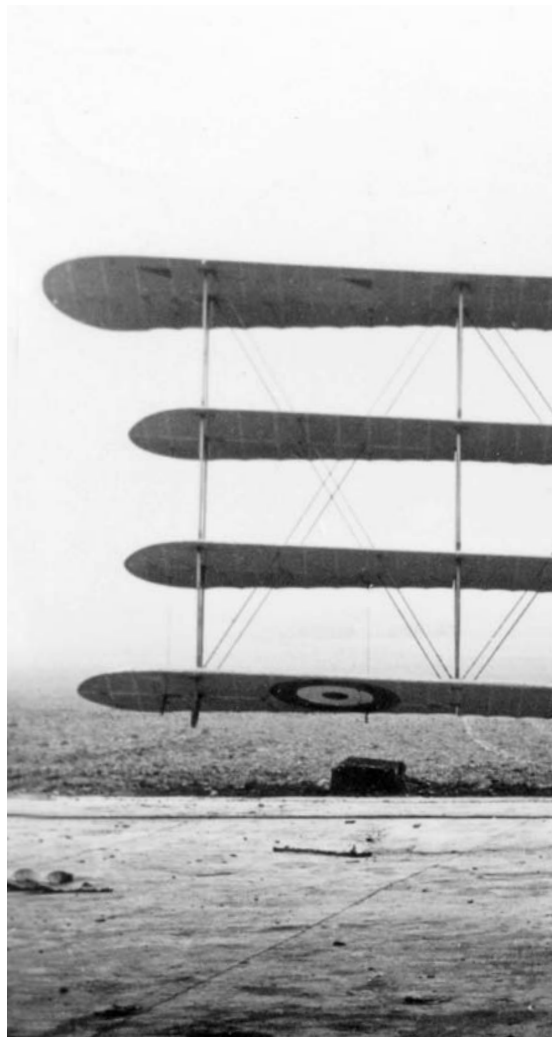


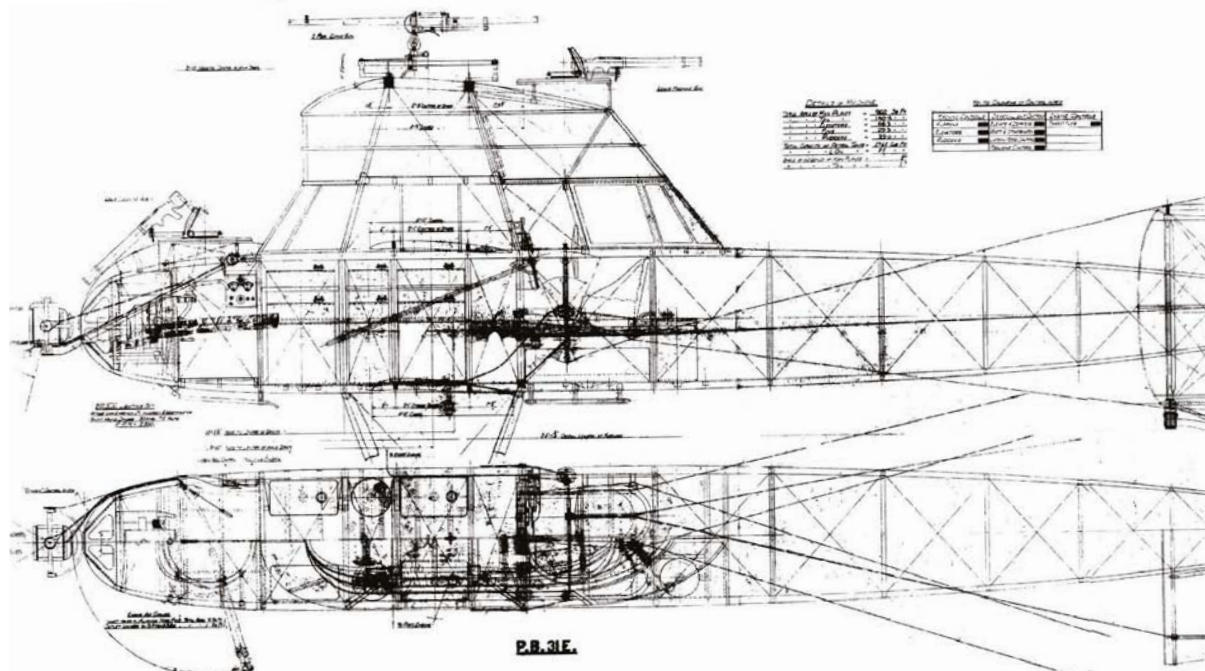
NOEL PEMBERTON Billing (**LEFT**) was born in Hampstead in north London on January 31, 1881. An impatient, highly individual child, he ran away from home and school at the age of 13 and signed aboard a sailing cargo ship bound for Mozambique and South Africa. While in Durban he worked as a bricklayer and tram conductor before joining the Natal Mounted Police.

Pemberton Billing fought in the Boer War during 1899–1901, and after being injured he returned to England to open one of the country's first garages, in Kingston-upon-Thames. Following another spell in South Africa, where he established one of the nation's first motor journals, *British South African Autocar*, he returned again to London in 1903 to marry Lilian Schweitzer and open a rifle range.

Pemberton Billing developed a keen early interest in aviation, and after various experiments with kites and gliders he opened a factory and airfield at Fambridge in Essex, where he continued his experiments and edited an unsuccessful magazine called *Aerocraft*. [See *Eric Gordon England's recollections of Pemberton Billing and Fambridge in All Very Wicked and Improper in TAH7* — Ed.]

After numerous other jobs Pemberton Billing established a marine business in 1911 on the River Medina near Cowes. With capital raised from this business, and with the investment of a financial backer, "PB" was able the following year to acquire a site adjacent to Woolston Ferry on the River Itchen at Southampton, where he planned to make high-speed launches and marine aircraft, work beginning in 1914. Pemberton Billing engaged the services of a young marine engineer, Hubert Scott-Paine, and set to work building a number of aircraft

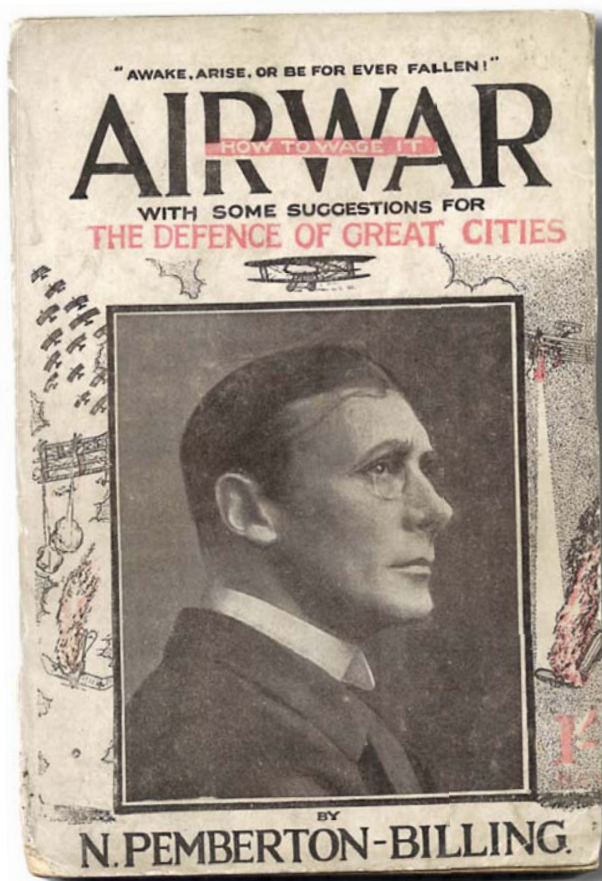




ABOVE A fragment of Pemberton Billing company drawings of the P.B.31E, signed by a young draughtsman by the name of R.J. Mitchell and dated September 18, 1916. It is unknown whether the future designer of the Spitfire had any input into the P.B.31E, but it is more likely he was only providing drawings at this time. **BELOW** The P.B.31E Nighthawk after its completion; it was deemed an improvement over the P.B.29E "Battle Plane", but still struggled to impress.

PHILIP JARRETT COLLECTION x 2





“After the pitiable confessions of His Majesty’s Ministers in the House of Commons of their hopeless unpreparedness against the menace of the air, and their attempts to shield themselves behind the plea of the impossible, it becomes, more than ever, necessary to prove to the nation that Great Britain’s supremacy in the air is simply a question of hard cash, hard work, brains and bravery . . .”

**NOEL PEMBERTON BILLING,
AIR WAR: HOW TO WAGE IT, 1916**

designs, the first of which was the innovative but unsuccessful P.B.1 flying-boat.

On the outbreak of war in 1914 PB joined the Royal Naval Air Service (RNAS) and helped organise the first air raid of any war, when three Avro 504s attacked the Zeppelin sheds at Friedrichshafen. Pemberton Billing also organised the anti-aircraft detachment of the RNAS with 12 Roll-Royce cars armed with guns and searchlights.

Defeating the Zeppelins

In March 1916 PB became the Member of Parliament for East Hertfordshire, being elected on a promise to press for protection against the German air raids which had started in January 1915, and fought hard to persuade the government to improve the efficiency of the Royal Flying Corps (RFC) and RNAS. Pemberton Billing was determined to do something practical to provide a defence against the enemy’s Zeppelin raids. His ideas, widely published at the time, proposed the following:

“A fleet of defending aeroplanes is necessary. Each machine must be so armed as to be capable of destroying an airship at a range equal to the range of its own searchlight, which must be not less than one mile. It must also carry a search-

light driven independently of the engines. It must have at least a speed of 80 m.p.h. [130km/h] to overtake airships.

“It must be able to fly as slowly as 35 m.p.h. [56km/h] in order to economise fuel and to render accurate gunfire and make night landings possible. It must be able to carry fuel for 12hr cruising at low speed to enable it to chase an airship to the coast. It must be able to climb to 10,000ft [3,050m] in not more than 20min.

“It must be fitted with control gear for two pilots, to allow one to relieve the other, and in the event of a gunner not being carried, each pilot must have equal facilities for working guns, bombs and searchlight. The engines must be silenced. The pilots must have a clear-view arc of fire above, in front and below. All the above requirements are within the capacity of any competent aeroplane designer.”

In 1915, when the Zeppelins were becoming a serious menace, PB was sent for by the Superintendent of Aircraft Production, Commodore Murray Sueter, and given leave from the Admiralty to return to his Woolston factory and arrange for the design and construction of a nightfighter aircraft capable of defeating the Zeppelins. Within seven weeks a large fighter had been designed and built in accordance with



ABOVE A previously unpublished photograph of the P.B.29E under construction at Woolston in 1915. The aircraft was designed and built in little more than two months, such was the need to counter the Zeppelin menace, which was threatening to undermine public morale. The aircraft was transported to Chingford and flown in January 1916.

the requirements Billing had laid down. It was named the P.B.29E, the E standing for Experimental. It was produced as a private venture; no Admiralty contract was issued for it and no serial number was ever allocated to it.

The P.B.29E "Battle Plane"

A large quadruplane with a biplane tailplane and three rudders, the P.B.29E was powered by a pair of 90 h.p. Austro-Daimler engines driving four-bladed pusher propellers. The rear fuselage was of triangular cross-section and had a two-wheel undercarriage with two small nosewheels on outriggers. Above the fuselage, between the third and top wing, was an enclosed position for a gunner armed with a Lewis machine-gun. There were two cockpits, one forward of the wing leading edge, the other just abaft the trailing edge and fitted with intercom and dual control.

After completion the P.B.29E was delivered to the RNAS station at Chingford in Essex by lorry and was tested by Flt Lt Sidney Pickles on January 1, 1916. A test report was prepared by Flight Commander G.H. Dyott at Messrs Hewlett & Blondeau's Works, Leagrave, Bedfordshire, and sent to Wg Cdr Lambe at RNAS Dover. The report, which is published

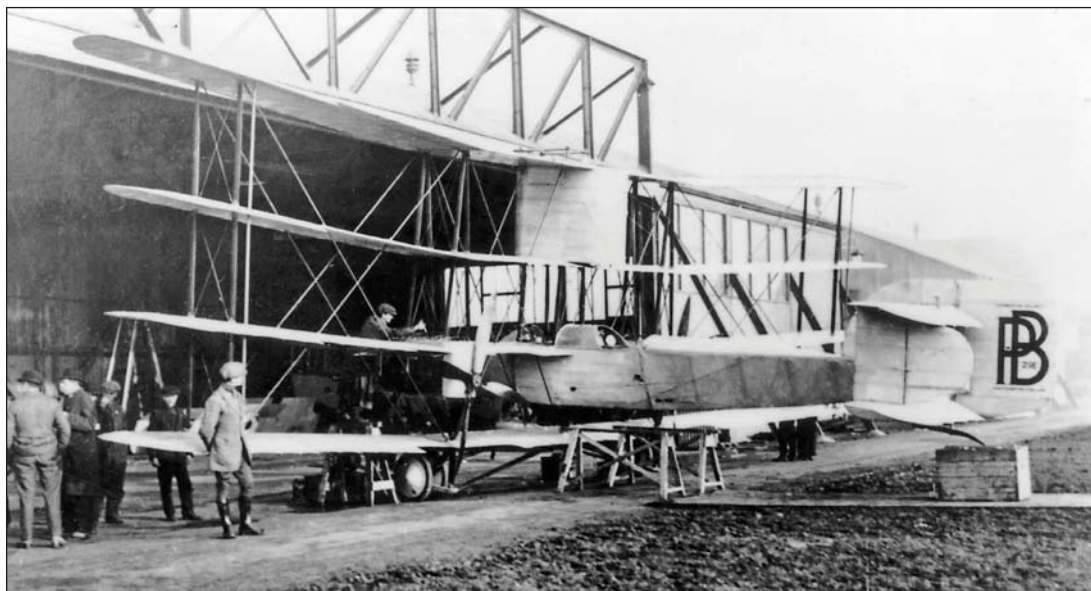
here for the first time, ran as follows:

"Following your instructions I proceeded to Chingford on Saturday, January 15 [1916], and examined the new PB quadruplane. Fortunately it was being tried out on the grounds, so I had an opportunity to watch the initial trials.

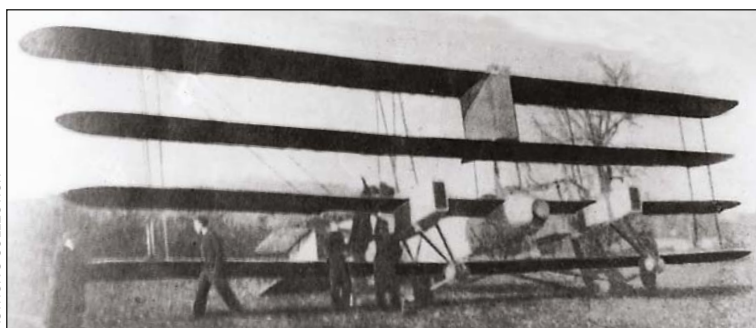
"The general outline offends one's sense of mechanical proportion in that the weights are not concentrated near the centre but distributed vertically as well as longitudinally, the former being a most undesirable characteristic. The centre of thrust of the propellers does not lay along the centre of head resistance; this would cause difficulties in the longitudinal balance, which, coupled with this heavy weight in the top plane, might prove a very serious factor in rough weather or extreme positions such as diving at a sharp angle.

"Much larger elevators should be necessary. This was confirmed by Pickles when he made his short hop. Also larger surface for the planes will probably be essential if much fore-and-aft stability is required. A large-area monoplane tail would be better than a small biplane tail of the same area. The ailerons and rudder controls appear quite satisfactory.

"The actual details of construction are very rough indeed, but that is not a serious fault which



ABOVE The completed P.B.29E at RNAS Chingford in early 1916. The Austro-Daimler engines were mounted in pusher configuration and drove four-bladed propellers. Ailerons were fitted to all four wings.



LEFT A poor-quality but very rare photograph of the P.B.29E following its completion. Note the searchlight mounted in the nose and the gun-equipped nacelle between the centre-sections of the upper wings.

AUTHOR'S COLLECTION

would affect the machine as an experiment. Structurally I think it is weak in some directions, such, for instance, as the fore-and-aft bracing of the wings to the fuselage. The fuselage is of triangular section which does not give much rigidity and the weights are too far back to give good balance with the passenger in his seat.

"The wing section is rather flat underneath and follows the usual Royal Aircraft Factory outline. With a full load on board, I don't think the speed is over 60 m.p.h. [97km/h], so when all is said and done, even if it could fly for 10hr on end, it would never cover a great distance. However speed is not everything and the machine should not be condemned on that score. I think results will show that the very large speed variation will not be realised in practice.

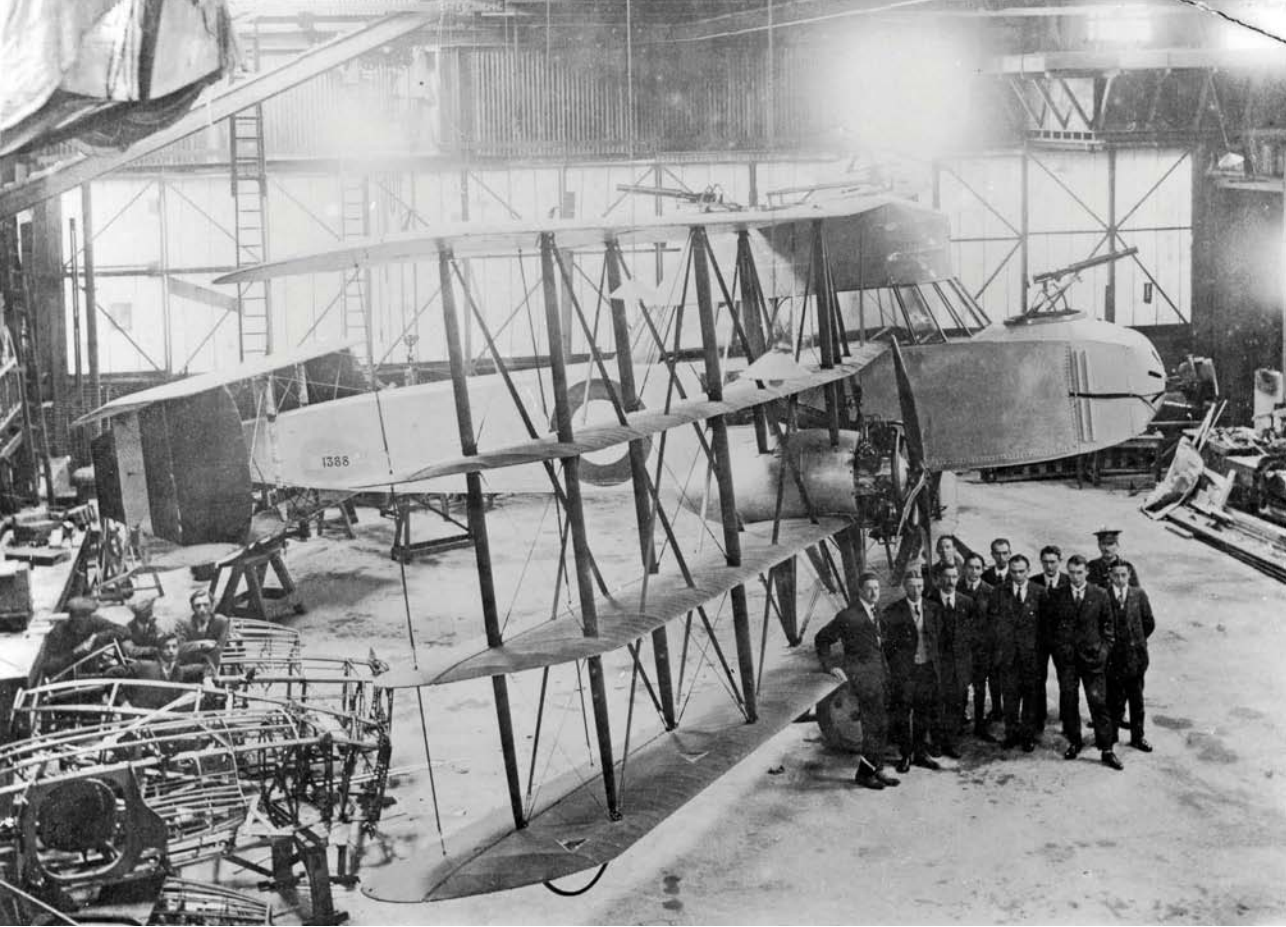
"The Third Sea Lord [Rear Admiral Frederick Tudor] was an interested spectator and afterwards enquired of Pickles how the machine handled in the air. 'Beautifully, the best machine I ever flew' was the reply. 'Change the elevators and she will be absolutely IT'. Statements such as these are apt to be misleading and do a lot of harm unless received by people like the DAS,

who has the happy faculty of listening to opinions and drawing his own conclusions.

"The results of this very brief test were received with the greatest satisfaction and on the strength of it I understand much larger work is to be put in hand. Flight Commander Fitch-Noyes told me that, as a result, the new 'Super Battle Plane' would be started at once. On enquiries as to what it was like, he told me it had five or six planes, three or four fuselages and weighed about 20 tons [20,320kg]. It would seem rather odd to jump to such sizes when no moderately large machine had yet proved itself to be of any value.

"Personally I was not so enthusiastic as the other observers, for I did not consider such a test capable of demonstrating anything at all, except showing very pronounced errors in the design. If difficulties arise, it will be found in the longitudinal balance when the top tank is full and the top passenger seat occupied.

"On looking at the general construction and outline, I would say that Mr Pemberton Billing had very little to do with it, and my impression is that certain people at the Admiralty were



PHILIP JARRETT COLLECTION

ABOVE Two P.B.31Es were ordered by the RNAS in November 1916, and were allocated serials 1388 and 1389. The first is seen here at Woolston with Pemberton Billing staff. Fourth from left in the group standing by the machine, in the back row, is R.J. Mitchell, who joined the company in 1915. The second machine was never completed.

anxious to try out such a type of multiplane and did not want to shoulder the responsibility for another failure as in the case of the [Blackburn] Sparrow, their idea being to get some constructor to work in conjunction with them, and who would get the blame if it was not a success."

"I should not herald it as a great success . . ."

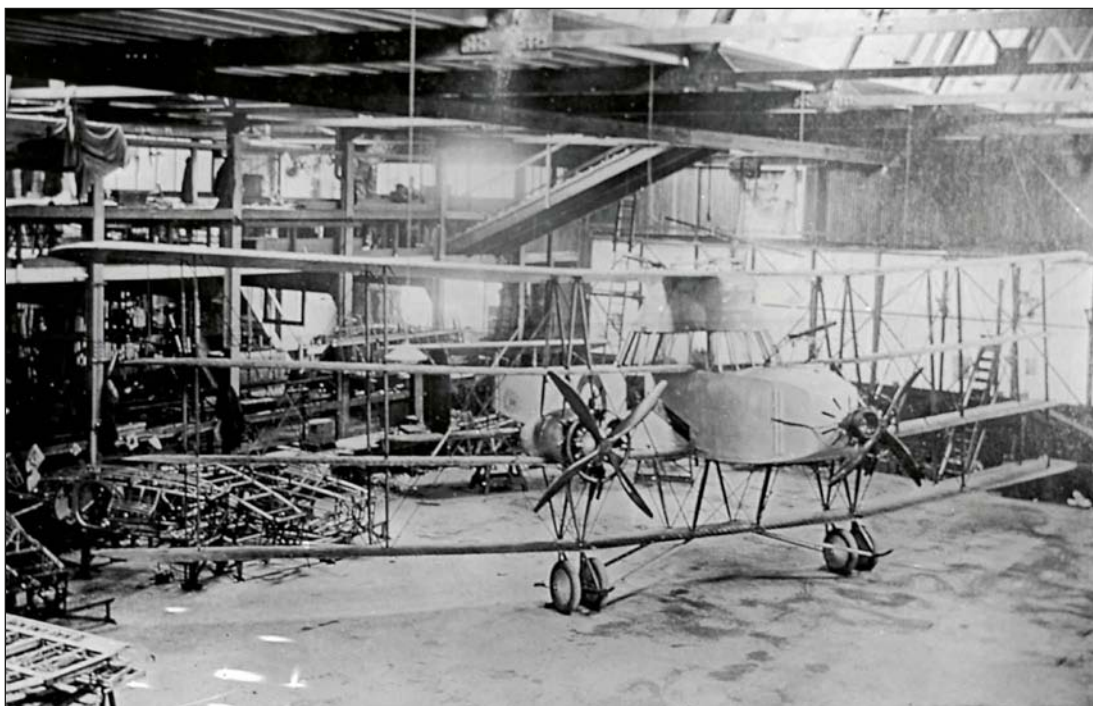
The report continues: "In conclusion, I must say that it is an interesting effort in spite of its bad proportions and no doubt some good information will result from it. Having made a short hop, I should not herald it as a great success and we must wait to see its performance in the air before saying very much further.

"In general, multiplanes have great advantages as regards speed and weight-lifting so the more authentic information we can get in this direction the better. I would like to see the top plane removed altogether and the tank and passenger seat accommodated in a larger and better proportioned fuselage. In this way, the pilot and rear passenger could remain where they are and the additional observer placed in front of the planes. In its present state I think it is

too small to permit the observer crawling up in to the top plane seat without affecting the equilibrium of the machine."

It is believed that it was also test flown by Flight Commander John Seddon. It was never flown operationally, as it was written off in an accident at Chingford later in 1916 and returned to Woolston. Despite Dyott's rather critical report, it was considered worthy of development and the Supermarine Aviation Works Ltd (as the company was now called) was given an order to build two more heavily-armed machines, to be known as the P.B.31E. It would appear that the fuselage of the P.B.29E was scrapped, but that its wings and tailplane (or parts thereof) were incorporated in the first of the new machines, for which the Admiralty issued contract CP 130778/16 on November 24, 1916.

It would seem that a development of the P.B.29E, the "Super Battle Plane", had been schemed even before it had flown, as Capt K.E. Kennedy RFC, in a lengthy report on the testing of the Davis non-recoil gun dated December 31, 1915, refers to the "P.B.31" as prospectively being fitted with several Davis guns.



ABOVE Another view of the P.B.31E, later called Nighthawk, at the Woolston works. The star louvres behind the nose-mounted searchlight were to provide cooling air to the auxiliary ABC engine that powered the light. The aircraft is fitted with a Lewis gun on the nose mounting and a recoilless Davis gun in the upper gun position.



ABOVE The completed Nighthawk, minus guns and searchlight, awaits its delivery to Eastchurch in December 1916. One of the most distinctive features of the P.B.31E was its extensively glazed cabin, in which the pilot sat forward of the leading edge of the third wing. Glazed panels in the fuselage served to improve the view downwards.

Supermarine P.B.29E & P.B.31E Nighthawk data

THE DIMENSIONS BELOW for the P.B.29E are extrapolated from 1915 drawings of the machine, based on the assumption that the chord and span of the upper wing were the same as those of the P.B.31E. The side view is dated November 12, 1915, the plan view December 8, 1915.

Powerplant

P.B.29E 2 x 90 h.p. Austro-Daimler engines in pusher configuration

P.B.31E 2 x 100 h.p. Anzani engines in tractor configuration

	P.B.29E	P.B.31E
Dimensions		
Span		
Upper	60ft 0in (18.3m)	60ft 0in (18.3m)
Lower	57ft 0in (17.4m)	—
Chord		
Top wing	4ft 2½in (1.3m)	4ft 2½in (1.3m)
Length	28ft 6in (8.7m)	37ft 0in (11.3m)
Height	16ft 8in (5.1m)	17ft 6½in (5.3m)
Wing area	—	962ft² (89.37m²)
Tailplane		
Span	15ft (4.6m)	—
Chord	3ft 1¼in (0.95m)	—
Propeller	9ft 0in (2.7m)	—
Weights		
Empty	—	3,677lb (1,668kg)
Loaded	—	6,146lb (2,788kg)
Performance		
Max speed	—	75 m.p.h. (121km/h)
Landing speed	—	38 m.p.h. (61km/h)
Normal duration	—	9hr

The P.B.31E was completed in November 1916 and delivered to Design Flight, Eastchurch, in the first week of December; it was test flown by Clifford B. Prodger in February 1917.

The Nighthawk

When it finally emerged, the new quadruplane, now known as the Supermarine Nighthawk, was a much more substantial aeroplane with a pugnacious look. The wings were a similar version of those used on the P.B.29E and the tailplane structure was virtually the same but with two rudders. The fuselage was of square cross-section. The gunner's enclosure was larger and located on top of the fuselage; it had provision for one or more two-pounder Davis guns at the front and Lewis gun(s) on a Scarff mounting at the back.

The extended nose of the fuselage had a Scarff mounting for a Lewis gun. In front of this was a trainable nose-mounted searchlight powered by an independent 5 h.p. ABC engine-driven generator. The first pilot sat in a fully glazed enclosure just forward of the leading edge of the wings and the second pilot sat behind him. The twin 100 h.p. Anzani engines were fitted to the second wing and drove four-bladed propellers.

By the time the Nighthawk was delivered it was realised that small single- or two-seat fighters armed with incendiary ammunition could successfully destroy Zeppelins (and later, Gotha bombers) when aided by searchlights and supported by anti-aircraft artillery. Pemberton Billing's ambitious plans were shelved.

The P.B.31E, untried in war, was scrapped on March 3, 1917, never having had the opportunity to test Pemberton Billing's theories of defence against night bombers, which he would revisit two decades later in the early days of the next major European conflict.



The P.B.31E proved to be underpowered, and was scrapped in March 1917. Pemberton Billing (whose name had no hyphen, despite his attempts to adopt one) continued to work on his unorthodox, but often innovative, concepts for aviation, including an unbuilt pre-Second World War concept for a flying-bomb. He died in 1948.

TAH ARCHIVE



Löwengeschwader's



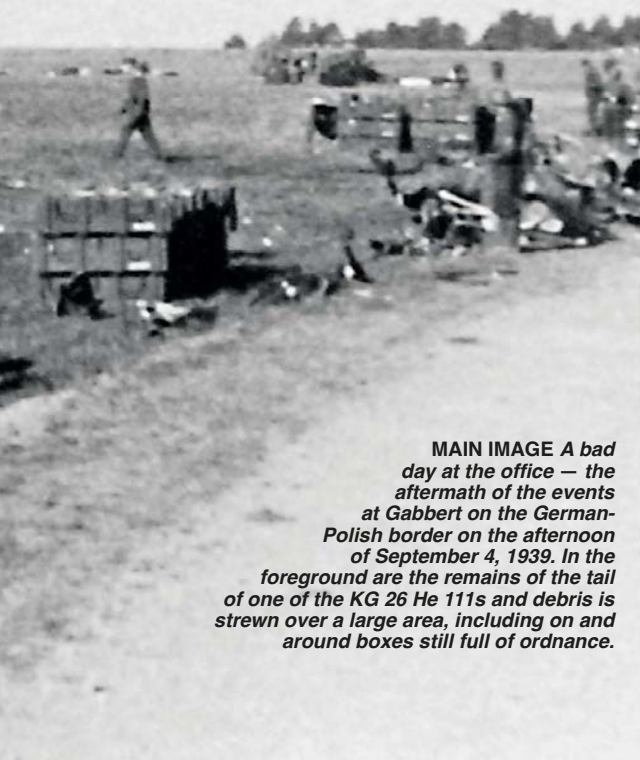
Big Bang

As well as marking the centenary of the start of the “war to end all wars”, 2014 also sees the 75th anniversary of the first shots fired in the Second World War. The popular view of Germany's invasion of Poland in September 1939 is of a ruthless war machine crushing all opposition in its way, but the Luftwaffe suffered some severe setbacks of its own — at least one of which was entirely self-inflicted — as **ALEXANDER STEENBECK** relates





ABOVE Heinkel He 111 1H+CP of 6./KG 26, with the Geschwader's distinctive lion badge on the fuselage, is prepared for a bombing sortie during the early days of the "Blitzkrieg" into Poland. After the inauspicious start related by the author, the unit went on to play a major part in the Battle of Britain and served in every European theatre of war until its surrender in Norway in May 1945.



MAIN IMAGE A bad day at the office — the aftermath of the events at Gabbert on the German-Polish border on the afternoon of September 4, 1939. In the foreground are the remains of the tail of one of the KG 26 He 111s and debris is strewn over a large area, including on and around boxes still full of ordnance.

KAMPFGESCHWADER (KG) 26, known as *Löwengeschwader* — the Lion Wing — is one of the most famous Luftwaffe units of the Second World War. What is much less well known, however, is that this distinguished bomber and anti-shipping unit, which fought on all fronts of the European theatre during the conflict, lost an entire *Staffel* (squadron) during the early days of the Polish campaign without even getting off the ground.

Following mobilisation on August 24, 1939, II Gruppe of KG 26 (II./KG 26) moved east from its home base at Lüneburg in northern Germany, via Werneuchen (near Berlin), to the small airfield at Gabbert, near the Polish border, where the unit waited for Germany's declaration of war. As bombs were loaded into most of the 32 Heinkel He 111s that formed the Gabbert detachment, the unit's armourers discovered that many of the bombs were getting stuck in the bomb adapter; the bomb's attachment screws were too long and poked out of the casing. The solution was simple: the screws were filed down flush with the casing. When this had been done, the unit was once again ready for action.

Boom!

On September 1, 1939 — the opening day of the Second World War — II./KG 26 flew its first missions to Posen and other Polish towns to bomb railway stations and other targets. The unit suffered no losses — a situation that was to change dramatically three days later.

On September 4 the fifth *Staffel* of KG 26 (5./KG 26) was scheduled to fly a late-afternoon sortie to Łódź. As groundcrews prepared the machines,



LEFT Luftwaffe armourers load 250kg (550lb) SC 250 bombs into the bomb bay of a Heinkel He 111. On each side of the bomber's central gangway there were four bomb stowage cells in which, unusually, the bombs were stored vertically with their noses facing upwards. On release they would tumble and self-right to drop nose-first on to their targets.

bombs on the ground detonated owing to the pressure wave. Then things went from bad to worse. The Heinkel had 2,000lit (440gal) of highly inflammable fuel in its tanks, which ignited simultaneously. Ground personnel and aircrews ran to their machines — also loaded with bombs and fuel — to pull them away from the ensuing inferno.

Surveying the damage

Six men were killed instantly and another 15 were seriously injured, one of which subsequently died some days later. The Heinkel, 1H+LN, was totally destroyed and the unit's remaining bombers were heavily damaged; 5./KG 26 was out of action for days as a result of losing the majority of its aircraft. The damage did not end there — a Junkers Ju 52/3m and Focke-Wulf Fw 58 were also seriously damaged.

The unit proceeded with a comprehensive clean-up, which took two full days. An investigation into the incident revealed that another mechanic working in the cockpit of 1H+LN had switched the bomb-selector panel in the cockpit to "live" — not for bomb-loading.

The crews were driven to the Heinkel factory at Oranienburg, near Berlin, to take delivery of brand new He 111s, and by September 10 the unit was ready for action again. The incident was, at that point, the most devastating in KG 26's history, and was never forgotten by the Staffel members who witnessed it.



the aircrews went over the plans for the attack. At around 1715hr an armourer was finishing up the loading of SC 10 bombs into He 111 1H+LN; *Leutnant* Ludwig Baum of 4./KG 26 recalls what happened next:

"We were resting in one of the huts when suddenly a massive explosion threw us from our beds. At first we thought that the Polish Army was attacking us, but when we got out of the hut and ran to the airfield we saw a huge trail of smoke coming from an He 111."

So what had happened? The armourer working on 1H+LN had dropped one of the armed 12kg (25lb) SC 10s. The resulting explosion detonated the other bombs already loaded aboard the bomber. Further explosions followed as nearby

Other aircraft in the vicinity of 1H+LN when it exploded suffered extensive damage, including this He 111 some distance from the explosion. The wrecked bombers were all dismantled and the unit was out of action for several days, at a time when they were much needed for operations.





ABOVE A pall of thick black smoke rises from Gabbert airfield in the wake of the explosion on the afternoon of September 4. Some eight bombers were destroyed and 5./KG 26 could not return to action until September 9.

LEFT One of the bombers' Junkers Jumo 211 engines destroyed in the explosion awaits the clearing-up operation. Note the ordnance boxes in the background.

BELOW After all fires were put out, the big clean-up began. In the foreground is the remains of the tail of one of the bombers. Behind it is He 111 1H+DN, which has special antenna equipment fitted on the top of the fuselage for direction-finding.



EXERCISE शिकशा

SHARPENING INDIA'S COLD WAR CLAWS



VIKRAM SINGH VIA AUTHOR X 2

WHEN THE CHINESE launched an invasion over the disputed Himalayan border with India on October 20, 1962, they met little significant opposition. Within a month they had captured all the disputed territory and announced a ceasefire. The Indians had been taken completely by surprise, and although the army responded as best it could, there was no challenge to the Chinese from the Indian Air Force (IAF), which was totally unprepared for the invasion. There was a variety of reasons for this. Most important was the fact that there were very poor radar and communication facilities in the remote areas where the fighting was taking place; indeed, there was only one portable piece of radar equipment available, an early-warning radar which was, at the outbreak of the war, in the western sector. It was hastily moved to the east in an Antonov An-12 *Cub* and set up.

Indian aircrews, despite having a variety of modern fighter and ground-attack aircraft, did not have the training necessary to operate in the hilly jungle terrain in order to be able to counter the Chinese advance. Had India used its air force effectively, the outcome of the brief conflict could have been very different — but this is by no means certain.

TOP In a perfect illustration of the spirit of healthy competition in which Exercise Shiksha was held, Corporal P. Simmonds (left) and Corporal N.K. Bhasin compare the length of their moustaches.

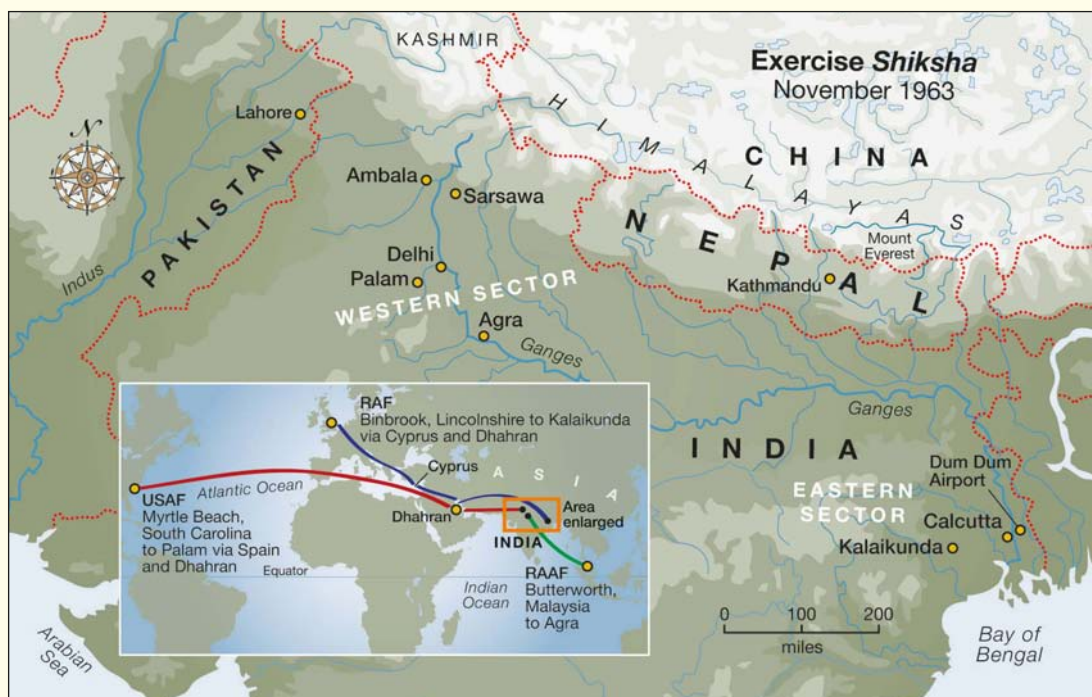
MAIN PICTURE With Indian Air Force Hunters in the background, aircrew at Kalaikunda study the basic principles under which Shiksha (meaning to study or educate) would be undertaken.



In October 1962 Chinese forces advanced into territory along the hotly-disputed Himalayan border between India and China. The invasion highlighted India's lack of preparedness against its communist neighbour, leading the USA, Britain and Australia to participate in a comprehensive air-defence exercise in which Javelins, Hunters, Gnats and Super Sabres would defend India's major cities against an attacking force of Canberras. Who won? **DOUG GORDON** tells the full story



- EXERCISE SHIKSHA
1. O.R.P. - Planned from 0500 on.
 2. Readiness State :-
White - 2 mts
Green - 5 -
Yellow - 10 -
 3. Take off - 30 Secs.
 4. Control - Radar
 5. Communications - R/T
 6. Target information :-
 - a. Twin engine Bomber
 - b. Span 65'
 - c. Speed up to 9M
 - d. Height 35000' to 50000'
 7. Target pursuit tactics
 8. Recovery



MAP BY MAGGIE NELSON

In the aftermath of the unilateral ceasefire declared by China in November 1962, the Indian Government had to take a long, hard look at its defence systems and its preparedness for war. The détente that India had sought with China was obviously very dead — and it had another belligerent neighbour in Pakistan, where the main bone of contention was again a dispute over territory, in this case Kashmir. A number of foreign powers were involved with India at the time. The Soviet Union was selling Mikoyan-Gurevich MiG-21 *Fishbed* fighters to equip the IAF, and its recent ideological disagreements with China encouraged its support of India.

The Americans were influential in advising the Indian Government throughout the course of the 33-day conflict. Prime Minister Jawaharlal Nehru was involved in extensive discussions with the American Ambassador, J.K. “Ken” Galbraith, and wrote two letters to President John F. Kennedy seeking air power assistance in countering the Chinese advance. Galbraith, presumably with the backing of the President, had advised the Indians not to employ their air force against the Chinese advance for fear of escalating the crisis. The USA did not want to get too deeply involved. To have done so would undoubtedly have provoked the Soviets, despite the USA conducting Lockheed U-2 spy flights over the area of conflict from a base at Takhli in Thailand. The UK Government at this time was an informed bystander.

On March 12, 1963, in a memorandum to the American Secretary of State Robert McNamara, the Joint Chiefs of Staff recommended a number of strategies of support for India, including the

following: “The USA should be prepared to commit one fighter squadron and one mobile GCI [ground-controlled intercept radar] to assist the Indian Air Force in air defense tasks in the event of the resumption of Sino-Indian hostilities on a scale which indicates the immediate danger of a Chinese air attack on Delhi or Calcutta. A US fighter squadron could be deployed in approximately 58hr, and a mobile GCI would require six days.”

The memorandum also stated that support for the IAF would be dependent upon the UK government assuming “overall responsibility for implementing the air-defense program for India, with assistance from other Commonwealth countries and the USA”. In the summer of 1963 a USAF team went out to India to install five air-defence sites. These were in the eastern sector and orientated towards China.

TO TEACH AND TO LEARN

Exercise *Shiksha* took place in November 1963, with the co-operation of four nations’ air arms: the IAF, RAF, Royal Australian Air Force (RAAF) and USAF. The exercise was conducted in two areas, the eastern and the western sectors. The overall commander for the exercise was Air Vice-Marshal (AVM) Arjan Singh. Western sector operations, based at Palam and Agra, were under the command of AVM Shiv Dev Singh. Eastern sector operations, based at Kalaikunda, near Calcutta, were commanded by AVM Erlic W. Pinto.

The first non-IAF unit to arrive in theatre for the exercise was the RAF’s No 64 Sqn, flying Gloster Javelin FAW.9Rs. These touched down



ABOVE Gloster Javelin FAW.9R (R for Range, fitted with the distinctive flight refuelling probe) XH887/Q of No 64 Sqn stands off as two of its squadron-mates refuel from a Vickers Valiant. On November 8, 1965, this Javelin's undercarriage jammed up during a night sortie from Changi, Singapore, and the aircraft had to be abandoned.

at Kalaikunda on October 28. One of the unit's dedicated roles was to provide fighter support for any ally being threatened by external aggression. Its Javelins were equipped for in-flight refuelling, the better to fulfil such duties. In 1962 the unit had been detached to Kuwait in response to the belligerent sabre-rattling of Saddam Hussein. For *Shiksha*, 12 Javelins were deployed to Kalaikunda, departing Binbrook and staging through Nicosia on Cyprus and Bahrain. The flight was accompanied by Vickers Valiant B(K).1 tanker aircraft of No 90 Sqn RAF. The 64 Sqn Javelins shared Kalaikunda with the Hawker Hunter Mk 56s of the Indian Air Force's No 14 Sqn.

The USA's commitment to *Shiksha* led to a squadron of North American F-100 Super Sabres being despatched to India in early November.

The first flight of six aircraft landed at the IAF base at Palam, near Delhi, in the western sector, on November 6. The F-100s were from the 356th Tactical Fighter Squadron (TFS) — the "Green Demons" — of the 354th Tactical Fighter Wing (TFW), based at Myrtle Beach AFB in South Carolina. A total of 18 aircraft from the 356th TFS deployed, 15 of which were single-seat F-100Ds, the remaining three being F-100F two-seaters, all flying from Myrtle Beach to Palam via Spain and Dhahran in Saudi Arabia.

As a prelude to its deployment to India the 356th TFS had spent some time flying practice intercepts against the Martin B-57 Canberras of the 4758th Defense System Evaluation Squadron in preparation for its operations with IAF and RAAF Canberras. Palam at that time was home to



Four North American F-100Ds of the 356th Tactical Fighter Squadron (TFS) await a mission on the ramp at Palam in November 1963. The USAF deployment of a dedicated interceptor like the Convair F-102 for *Shiksha* may have been a more logical choice, and caused some controversy when it came to analysing the results of the exercise.

VIKRAM SINGH VIA AUTHOR



ABOVE India received its first batch of Hawker Hunter Mk 56s (an export variant of the RAF's F.6) in November 1957, and although the type was outclassed as an air superiority fighter by the early 1960s, it went on to prove itself as an adaptable ground-attack aircraft and remained on the Indian Air Force's inventory until the mid-1990s.

the Hunters of No 7 Sqn IAF, the Folland Gnats of No 2 Sqn IAF being based at Ambala to the north of Delhi. Both types were scheduled to take part in *Shiksha*.

The Australians sent two Government Aircraft Factory-built Canberra B.20s and three crews to participate in *Shiksha*, these arriving at Agra, where they were to be based for the duration of the exercise, on November 6. They had flown from the RAAF base at Butterworth in Malaysia where they were assigned to No 2 Sqn RAAF.

The essential purpose of Exercise *Shiksha* was to evaluate India's air defence systems and procedures and advise on future development and training. To this end the Canberras of the RAAF and the IAF would provide the attacking force and the Javelins, Super Sabres, Hunters and Gnats would attempt to intercept them and prove

their "kills" by taking gun-camera photographs. The Indian Air Force flew the ground-attack/interdictor B(1).58 variant of the Canberra.

INTO ACTION

Shiksha operations began on November 9 for the Kalaikunda-based units in the eastern sector, and on the 14th for the western sector units. Up until that point the Javelins had been kept busy making orientation flights by day and night along with practice interceptions in conjunction with the radar stations. On October 31, the first Javelin sortie out of Kalaikunda had included a sector recce to investigate NDB (non-directional beacon) letdowns, GCAs (ground-controlled approaches) and circuits at Calcutta's civilian Dum Dum airport, where the Javelin aircrew received a welcome request from the control

RAAF Canberra A84-241 is prepared for departure to India at Butterworth. The aircraft had to return with a warning light indication and was replaced by A84-237, which left Butterworth at 1300hr for Kalaikunda, where it refuelled before flying on to Agra.

PETER JONES





ABOVE LEFT An Indian Air Force pilot in the cockpit of a Folland Gnat. The diminutive fighter entered front-line service with the IAF in 1960 and proved popular with its pilots. **ABOVE RIGHT** RAF air- and groundcrew were accommodated in primitive tents at Kalaikunda, in contrast to the RAAF's comparatively opulent lodgings at Agra.

tower. Ted Wright was a navigator with the 64 Sqn detachment and recalls:

"The duty air traffic controller asked, as we overshot from a circuit, if we could 'carry out a flypast, very low and very fast. Please sir!' This is at an international airport! There is nothing pilots like more than being asked to perform a low, fast flypast. This we duly did at around 530kt. As we flashed past the tower it was with some alarm we spotted large kite birds, which, in those parts, like to soar in the thermal heat of the airfield concrete. We warned the others, yet to be initiated at Dum Dum, to watch out for these birds."

The F-100s at Palam initially spent some time on orientation exercises, before taking on their defensive role in *Shiksha*. The IAF and USAF at Palam were concerned primarily with the defence of Delhi; their roles were to intercept the IAF and

RAAF Canberras before the bombers got within 100 miles (160km) of the capital. The fundamental difference between the F-100s and the Gnats and Hunters of the IAF was that the Super Sabres were simulating interceptions using GAR-8 (later designated AIM-9E) Sidewinder missiles instead of guns. The Indian Gnats and Hunters were using guns-only for the intercepts, and categoric evidence of a successful or unsuccessful intercept was provided by the gun-cameras. This was later to prove problematic in analysing the results of the interceptions.

The RAAF Canberra B.20s at Agra spent the first three days of their detachment performing familiarisation flights over the local area. They commenced operations in the eastern sector on November 9, performing a high-level attack on Calcutta. These attacks were repeated on the 13th

Javelin FAW.9 XH885/R of No 64 Sqn at Tengah, Singapore, in 1966, carrying de Havilland Firestreak infrared homing air-to-air missiles on the outer pylons. The unit had received its first Javelins in September 1958 and operated the type until its disbandment in June 1967.





ABOVE A pair of Indian Air Force Canberra B(I).58s on a high-altitude sortie. The type formed the backbone of the IAF's bomber and photo-reconnaissance force, seeing regular combat from its introduction into service in the summer of 1957 through to the type's final retirement in May 2007 — a remarkable career spanning some 50 years.

and 14th. During November 15–19 the Canberras concentrated their attentions on Delhi, flying medium-altitude attacks. Flying Officer Peter Jones was with the detachment:

"From my logbook records I see that I flew five ADEXs [air-defence exercises] between November 13 and 19; two out to Calcutta and back — 3hr 40min each — two to Sarsawa and back — 2hr 20min each — and one local; Delhi—Agra — 1hr 35min. From memory all ADEXs were carried out at medium to high level as the risk of birdstrike was too high at low level. I did two trips to Delhi; a local familiarisation flight and an unlogged flight along the Himalayas, trailing IAF Canberras. I assume that all three crews carried out the same number of ADEXs."

Interceptions during *Shiksha* were invariably scrambled. The Operational Readiness Platform (ORP) at Kalaikunda is described by Ted Wright:

"Alongside the ORP — in reality, a wider bit of runway — was a dugout with a corrugated iron roof, lined with bricks, containing one or two field telephones linked to the local GCI. There was no tele-scramble. To scramble an aircraft, you pulled on a rope which pulled up a numbered wooden board. The groundcrew would see the board and tell the appropriate aircraft crew to start up. The aircrew were already strapped in, getting hot! This worked fine until the engines started and the jet blast blew all the signs down; and tugging would not pull them up against the blast! There was much flapping of arms and yelling and gesticulating to get the right aircraft airborne!"

However, despite the drawbacks, the exercise proceeded smoothly for No 64 Sqn. The Javelins flew regular intercepts, and on one occasion

intercepted a total of eight IAF Canberras in three sorties. The 356th TFS at Palam commenced its *Shiksha* operations on November 14. Captains Jay L. Holly and Leigh M. Holt ran from the alert tent to their waiting Super Sabres on the ORP, and within seconds were strapped in and had taken off on the squadron's first intercept, in this instance against Canberra B(I).58s of No 5 Sqn IAF based at Agra. During November 14–20 all units at Palam were engaged in intercepting the IAF and RAAF Canberras.

ANALYSING THE RESULTS

Was *Shiksha* a success? Was it worth the effort? The original idea of the exercise was to help train the IAF in air-defence tactics. The installation of air-defence radar equipment and the exercise itself were the means by which this could be achieved. Vice-Commander of the US Nineteenth Air Force, General Gordon M. Graham, was responsible for the overall control of *Shiksha*. He oversaw the installation of the radar systems and recalled in his book of memoirs, *Down for Double: Anecdotes of a Fighter Pilot* (BrandyLane, 1996):

"The USAF's job was to install five air-defence radar sites and then to conduct a joint exercise to train the Indians in air-defence procedures. I selected sites facing China of course. When I returned, after the survey visit, the Indians had reoriented all but one of them to face Pakistan! I had a real challenge to turn that around. There was a lot of resistance from the Indian Air Force."

Clearly, the Indians perceived the threat from Pakistan to be more acute than that from China, despite the fact that China had so recently invaded Indian territory. It was evident that the

BARREL RUM & VULTURES — THE RAAF PERSPECTIVE

PETER JONES was a Flying Officer with No 2 Sqn RAAF during Exercise *Shiksha*; he recalls life at Agra, where the unit's Canberra B.20s were based throughout the operation in late 1963:

"WE WERE HOUSED in the No 1 Mess at Agra, which was reserved for senior IAF officers — wing commanders and above. We were issued with a batman who looked after our every whim, including filling the tub with bath water and offering us our underpants to step into. Most of us declined the second invitation, but our clothes were always laid out. Sometimes they matched and sometimes if you wore what was offered you would definitely stand out in a crowd!

"The Indian junior officers were incredible, offering to take us anywhere we wished and frequently doing so. We even had an offer of a tiger shoot using elephants. On that day, however, our CO decided that we should visit New Delhi, so no tiger-shooting for us — thank goodness.

"As Australians, we were perceived by the IAF junior officers to be beer-drinkers of some repute. Their tactic on a social night was to approach each of us individually in groups of five, have a round of beer and then be replaced by another five, and so on throughout the night. We never saw the same five twice.

"We were invited to the No 2 Mess, squadron leaders and below, and the same procedure was put in place. Sometime around midnight, myself and a fellow officer were the only two left. We did the only honourable thing we could do — we lifted their mascot from the foyer. The mascot was a leopard mounted on a concrete base (pinched, I might add, from a regiment in the Himalayas). Two of us carried the mascot back to the No 1 Mess, a distance of some three miles, and managed to hide it on the roof. Eventually, we were able, after much effort, to bring the leopard down from the roof and present it to the No 1 Mess — which caused a bit of a stir!

"We were also guests of the NCOs' Mess and all of us were 'persuaded' to drink 'barrel rum', the nightly drink of the troops stationed in the 'hills'. For some of us it was a night never to be remembered — not me, I hasten to add. All of these social events were done in great spirit, and it made our stay in Agra very memorable. I don't think we ever got used to the food, however. The mess staff tried very hard to help, even suggesting that we go and shoot the wild ducks on the airfield pond — needless to say, we didn't.

"The flying was enjoyable albeit a little predictable. We saw no fighters and managed to avoid all the vultures; you always knew where the towns and villages were, as the circle of birds gave them away. Our trip along the southern range of the Himalayas in Uttar Pradesh will stay with me forever. Where else in the world could you fly 200ft above ground level and yet be at 20,000ft-plus? Amazing!"



ABOVE In command of the RAAF detachment at Agra was Wg Cdr Frank Griggs (right), who is seen here in conversation with Fg Offs Ian Westmore (left) and Dennis Connell.

RAAF HISTORICAL OFFICE

Ian Westmore taxis in at Agra in Canberra B.20 A84-237 after a Shiksha sortie. Two RAAF Canberras were deployed for the exercise, the other being A84-247. Although the Canberra had first flown in 1949, its high-altitude capabilities kept it on the front line throughout the 1950s and 1960s.

PETER JONES





ABOVE The 356th TFS was part of Tactical Air Command, the badge of which is seen here on the tail of F-100D serial 56-3051. The unit was reactivated as a Super Sabre unit in late 1956, having seen a great deal of combat as the 356th Fighter Squadron flying P-51s from the UK during World War Two, after which it was disbanded in 1946.

foreign participants and the Indians had different agendas when it came to the exercise itself. The USA, UK and Australia perceived *Shiksha* as a training exercise. As Ted Wright explains:

“Control and procedures were very basic compared to the sophistication of UK radars. But *Shiksha* is Sanskrit for training or education, and we were there to do just that, without trying in any way to lecture or preach to the Indian Air Force about how it should operate”. As a result RAF operations from Kalaikunda were generally free of controversy.

Unfortunately the same could not be said of the operations out of Palam. The pilots of the 356th TFS shared the philosophy that the exercise was one in which their role was to support the IAF in developing its air-defence skills. The Super Sabre was not an air-defence fighter, however, and the pilots of the 356th were not trained in interception tactics. What limited training they had in this area was with Sidewinder air-to-air missiles, not with guns. Leigh Holt was with the detachment:

“Our mission was to fly dummy Sidewinder attacks against the Aussie Canberras that were flying out of another base in eastern India. I think we were giving the Indian radar guys practice since we didn’t have any Indian pilots with us.”

Wayne Gosnell was also with the detachment and explains: “Air defence was pretty much a secondary mission for us, although we did do some training for it. At that time the Convair F-102 was the primary USAF air-defence aircraft, with the [same company’s] F-106 just coming on to the inventory”.

Should the USAF have given more thought to the unit it deployed to India for the exercise? Arguably, yes. There were four F-102 Delta Dagger squadrons with the United States Air

Forces in Europe (USAFE) at that time. It may well have proved easier and more worthwhile to deploy one of these.

THE GUN/MISSILE CONTROVERSY

The main controversy concerning the F-100 in *Shiksha* was based around the fact that the pilots allegedly recorded no successful interceptions of “enemy” aircraft. Statements made in Indian publications since the exercise have emphasised this point, and used it as a means of demonstrating the superiority of the pilots of the IAF over the pilots of the 356th TFS. In his recent book, *Airborne to Chairborne: Memoirs of a War Veteran* (Xlibris Corp, 2012), Gp Cpt A.S Ahluwalia, who was with No 5 Sqn IAF flying Canberras out of Agra at the time of *Shiksha*, states:

“We were a bomber force attacking Delhi. The defending force was a squadron of F-100s of the USAF and Hunters and Gnats of the Indian Air Force; a total of three squadrons to intercept the bomber force was based at Palam, Delhi. There were aircraft at readiness on the Operational Readiness Platform to ‘scramble’ at a moment’s notice. Surprising, but true, the American interceptors could not intercept a single bomber before the 100-mile zone, whereas the Hunters and Gnats achieved near 100 per cent success.

“The interception had to be recorded on film once the the interceptor caught the bomber, which meant that once the film showed that the bomber was in the crossbar of the gunsight of the interceptor, it was a kill. None of the films of the American interceptors showed any interception.”

It is inconceivable that the Americans were so unskilled that they failed to intercept any of the Canberras; they claimed a kill if their Sidewinders had “locked on”. Wayne Gosnell explains:



ABOVE LEFT A last-minute briefing beside Javelin XH893 before a Shiksha sortie. From left to right: Wg Cdr M.S. Khanna (CO, 14 Sqn IAF); Master Navigator A. Parker and Fg Off Roberts of 64 Sqn RAF and Sqn Ldr N.S. Malik of 14 Sqn IAF. **ABOVE RIGHT** Triple ace General Gordon M. Graham logged 9,200hr in 78 different types of aircraft.

"We probably did break off the intercepts two to three miles in trail as soon as we had a lock-on indication from our Sidewinders. I don't know what we could have gained by getting any closer. We weren't going to dogfight with a Canberra!"

This misunderstanding was, in reality, based on the capabilities of the different aircraft flown by the USAF and the IAF. The rules were flawed and made no allowance for the F-100s intercepting solely with missiles. Had F-102s been despatched to India, the same problem would have arisen because the Delta Dagger was exclusively armed with missiles and rockets for its air-defence role. It is right, however, to herald the achievement of the Gnat and Hunter pilots, whose success in intercepting the bombers should not be underestimated. Gordon Graham, however,

was scathing in his opinion of the IAF aircraft:

"They had a stable full of real trash for aircraft; Hawker Hunters and Folland Gnats. The Gnat was an 8,000lb [3,630kg] airplane with a range of only 70 miles [110km], a point-defence fighter that was like a sports car. You put it on like a suit of clothes, not like entering a cockpit. I can't believe the Indians would have decided to buy the 'plane. It had two 0.50-calibre guns, but no missiles. The Hunter was a second-generation subsonic British jet."

Nevertheless, these two aircraft served with the IAF for a number of years and both acquitted themselves well in the Indo-Pakistan War in 1965. So pleased with the performance of the Gnat was the IAF that it developed the design into the Ajeet fighter, produced by Hindustan Aeronautics, which served with No 2 Sqn until 1991.

The small size of the Gnat is accentuated alongside the type it replaced in IAF service, the Dassault Ouragan — named Toofani (Hindi for Hurricane) in Indian service. The French-built Toofani was used in the reconnaissance role during the Sino-Indian conflict of late 1962.

VIKRAM SINGH VIA AUTHOR





PETER JONES

ABOVE Australian personnel disembark from a Douglas Dakota at Palam for a local sightseeing tour during a day off from flying attack profiles for Exercise Shiksha. **BELOW** The 356th TFS's distinctive shoulder patch, which incorporated a green demon in accordance with the squadron's nickname. The unit was disbanded in 1992.

The Australians at Agra felt that they were surplus to requirements during *Shiksha*. The official report of the exercise, written by Wg Cdr Frank Griggs, reflected the RAAF's perspective:

"The No 2 Sqn detachment accomplished very little training in its operational role. In addition, the provision of target aircraft was well within the capability of the IAF. The Indian air-defence organisation lacks competent fighter controllers, and it would appear therefore that the provision of trained controllers would be a fitting Australian contribution to future exercises of this nature."

SWAPPING RIDES

Despite all the difficulties that arose during the exercise, the camaraderie between the pilots remained cordial and productive. The USAF pilots enjoyed the relationship they had formed with their Indian counterparts. Many of the Indian pilots were happy to have a ride in the American unit's two-seat supersonic F-100Fs, as Leigh Holt recalls:

"One Sunday we were taking some Indian pilots for rides in our two-seaters and the pilot flying with me was a Hunter pilot. He had never been in an aircraft with an afterburner, which he called a 'reheater'. He had a good time with it, doing loops all over India for about an hour."

The Indian pilots reciprocated with rides in their two-seat Hunter T.66s. General Graham

very nearly got a ride in one of the newly-acquired MiG-21s, organised for him by AVM Pinto. However, at the last moment, just as he was about to climb into the cockpit, he was ordered to leave the base at Chandigahr. Although Pinto had been discreet in arranging the flight, someone at IAF HQ had got wind of it and stopped it.



Everybody had the opportunity to see a little bit more of India than the view from the air and on their bases. One of the sights on the itinerary was the Taj Mahal at Agra, not a significant journey for the Australians based just outside the town, but for the Javelin crews at Kalaikunda a Dakota was laid on to Palam. It was not the most comfortable of journeys. The aircraft was fitted out for supply drops in the north-eastern provinces and the bare-metal seating along the fuselage sides was far from ideal.

The exercise was largely accident-free apart from two Javelin incidents at Kalaikunda. Ted Wright recalls: "The first was a night take-off which culminated in an aircraft going into an overshoot. The crew crawled out unhurt. The carcass of the aircraft [XH765/A] was left behind; the engines, guns, missiles, radar and systems were all removed. The second involved our USAF exchange crew. During the ciné phase they got into a spin, a manoeuvre not recommended in the



ABOVE Pilots of No 7 Sqn IAF pose with Col Joseph Kruzel (third from left), the Commanding Officer of the 354th Tactical Fighter Wing, of which the 356th TFS was part, and a senior RAAF officer (second from right) at Palam. *Shiksha* was the first – and only – joint exercise conducted between the IAF and USAF during the Cold War.

Javelin owing to the difficulty in recovering. The navigator was duly ordered to eject. The aircraft promptly came out of the spin. There was much badinage and ribaldry afterwards debating the value of navigators!"

The exercise concluded on November 19 and the participants geared up to return home. The 356th TFS left India on the 22nd, bound for Dhahran in Saudi Arabia. It was here that the unit received some extraordinary news. Leigh Holt explains:

"When we landed in Saudi Arabia we were immediately put on alert and told that there was unconfirmed information that President Kennedy had been shot. We were able to confirm it on the Armed Forces Radio as we were flying over

Athens on the way to Spain. When we landed in Spain we were again placed on alert. We returned to Myrtle Beach the following day."

For the pilots of No 64 Sqn at Kalaikunda there was another surprise. Four aircraft and crews were not going home to Binbrook, but were to proceed to Tengah in Singapore to reinforce No 60 Sqn. With relations between Indonesia and Malaysia deteriorating, there was a need to increase the air-defence capability of 60 Sqn to cover Borneo and northern Malaya. The Australian Canberra crews returned to RAAF Butterworth on November 22. It had originally been intended that *Shiksha* would become a regular occurrence. In the event, it was not repeated.



Javelin XH765/A after its night accident at Kalaikunda. RAF Senior Aircraftman Trevor Taylor recalls: "Before the detachment we had modified the pitot-static system; the drain taps in the system were not large enough for any moisture that got into the pipes, so we fitted lengths of Maricon [rubber] tubing in place of the metal drains. These were held in place with locking wire. One of these in the nav's pitot system came off, giving him a false low-speed reading on take-off. The discrepancy led the pilot to abort the take-off, but a bit too late".

TREVOR TAYLOR





Echoes from Dawn Skies

A Lost Manuscript Rediscovered

THE STORY SO FAR: Shortly before his death in 1956, aged 76, renowned pioneer pilot and flying instructor F.W. Merriam — who in 1912 was the first man to fly an aeroplane through cloud — completed a book manuscript, entitled *Echoes From Dawn Skies*. It comprised recollections of the early years of flying, gathered from his contemporaries, many of whom had by then become leading figures in the aviation world.

Seeking “to present a more personal and intimate picture than has yet been produced”, Merriam had asked them each to “contribute a story of a personal nature, something that had never before been published”.

The result was a treasure-trove of fresh, first-hand insights into the lives, the work, the unquenchable spirit and the humour of these early flyers. Sadly Merriam died before the book could be published, and the priceless manuscript vanished into obscurity for more than half a century . . . until, in the summer of 2013, it came to the attention of *The Aviation Historian*. Merriam’s granddaughter, Sylvia Macintosh, aware of the manuscript’s importance and keen to see it finally in print, discovered *TAH* and got in touch with Managing Editor Mick Oakey — who, having picked himself up off the floor after the surprise phonecall, immediately set the wheels in motion. As Mick says, “Reading the material today is the next best thing to teleporting back in time and sharing a pint or a convivial dinner with these remarkable men”.

Merriam introduces his chapter on John Lankester Parker, published for the first time here, with these words:

“Like many of us, John started the hard way. Adversity proved no deterrent as he conquered the hazards of early aviation. After qualifying for his ‘ticket’ [Royal Aero Club pilot’s licence No 813] in 1914 and groping to find his bearings, he chose the precarious branch of test flying, at which he made a great success. His contribution is long but most interesting, so without cutting, I present it here, feeling sure that the air-minded public will find it absorbing . . .”

RIGHT John Lankester Parker (furthest right) with Capt A.S. Wilcockson (centre) and Harold Piper, his colleagues during the trials of the Short Mayo Composite at Rochester in 1938. We have used Merriam’s own original title for Lankester Parker’s chapter — “Better To Be Born Lucky Than Rich” — luck always trumps money in the test-flying business!

The third part of our exclusive serialisation of **FREDERICK WARREN MERRIAM’s** unpublished volume of collected early-aviation memories, *Echoes from Dawn Skies*, features his chapter on John Lankester Parker. After a challenging start, Parker went on to become one of Britain’s finest test pilots, first for the Prodger-Isaac Aviation Co, then for Short Bros, with which he had a long and distinguished career



PHILIP JARRETT COLLECTION

"BETTER TO BE BORN LUCKY THAN RICH..."

John Lankester Parker CBE FRAeS
Hon MSLAE, 1896-1965



LIKE ANY NORMAL boy of my era, I was fascinated by such stories as Jules Verne's *Clipper of the Clouds*, and by the early efforts at flying. I cannot recollect exactly when it was that the urge to fly overtook me, but my brother reminds me that from a very early age the sight of any big bird soaring and wheeling without any apparent effort had a marked effect on me. That a mere bird could do, apparently just for the joy of achievement, what we clever human beings had found so impossible filled me with a restlessness and a great desire to emulate them.

The first aeroplane I saw in flight was a Blériot monoplane. It was during the military manoeuvres of 1912, held that year in East Anglia. Two of the most famous airmen of the day, Geoffrey de Havilland and Arthur Longmore, landed their B.E. biplanes, on different occasions, in fields quite close to my home. That was, perhaps, the first time aeroplanes had been seen at close range in Suffolk.

These manoeuvres were not undertaken without tragedy and the loss of a number of gallant pioneers of military flying. There were three fatal crashes involving monoplanes, and the inevitable outcry in the press led to the monoplane type being banned by the military authorities for a number of years. At the time, the biplane had at least as good a performance

as the monoplane, so this drastic decision did not seem to matter very much. But one has a strong feeling that it is a bad thing for progress in man's fight against nature to impose any unnatural restriction.

The sight of an aeroplane in flight; the fascinating sound of a well-tuned rotary engine; its regular hum which nonetheless reaches the distant hearer in surges of sound as though carried on great waves; the smell of burnt castor oil; the "peardrop" smell of fabric dope — these things are still nostalgic memories to me, but at that time they fired me with boundless enthusiasm. Somehow, someway, I must fly.

Faced, perhaps, with rather special difficulties, for I was something of a cripple and my family were not exactly enamoured of the idea nor had they money to spare to meet the considerable cost of learning to fly, my prospects were far from bright.



To Brooklands

How it all came to pass is another story, but towards the end of 1913 I joined the Vickers Flying School at Brooklands. On June 18, 1914, I qualified for Royal Aero Club Certificate No 813. There it was that I first came into contact with Warren Merriam (**ABOVE LEFT**), the much admired chief instructor of the other important flying school at Brooklands, Bristol. Even then he was looked upon as a veteran and his name was already a household word.

BELOW Frederick Warren Merriam comes in to land at Hendon in a Maurice Farman Longhorn. Merriam was the chief instructor of the Bristol Flying School at Brooklands until he was appointed civilian instructor to the Naval Flying School at Hendon in September 1914, despite having volunteered for active service when war broke out.

F.W. MERRIAM ARCHIVE x 2



I was very pleased with myself when I had taken my certificate. In the third and final test for the ticket, the vol-plane, to use the vernacular of the day, the requirement was to glide down from not less than 330ft (100m) without any further use of the engine. I went higher than a previous candidate, no doubt much to the chagrin of my chief instructor, Harold Barnwell. I reached the terrifying height of 1,400ft (430m), when it was necessary to leave go of a friendly strut in order to turn off the switch.

Barnwell's annoyance soon gave way to smiles, however, when, on walking over to me, to almost the middle of the aerodrome, partly to remonstrate, partly to congratulate, but mostly to taxi the machine back to the hangar, he found that the engine could be started. I had remembered to turn off the petrol during the descent. Had I not done so, the engine, a 50 h.p. Gnome, which had no float chamber and no throttle, would have been choked full with petrol in both crankcase and cylinders. I did not tell him that it was only when I had descended to levels with which I was more familiar that I dared again to take leave of my friendly strut to twiddle the tap, just in time for the windmilling propeller to clear away the surplus fuel before I came to rest.

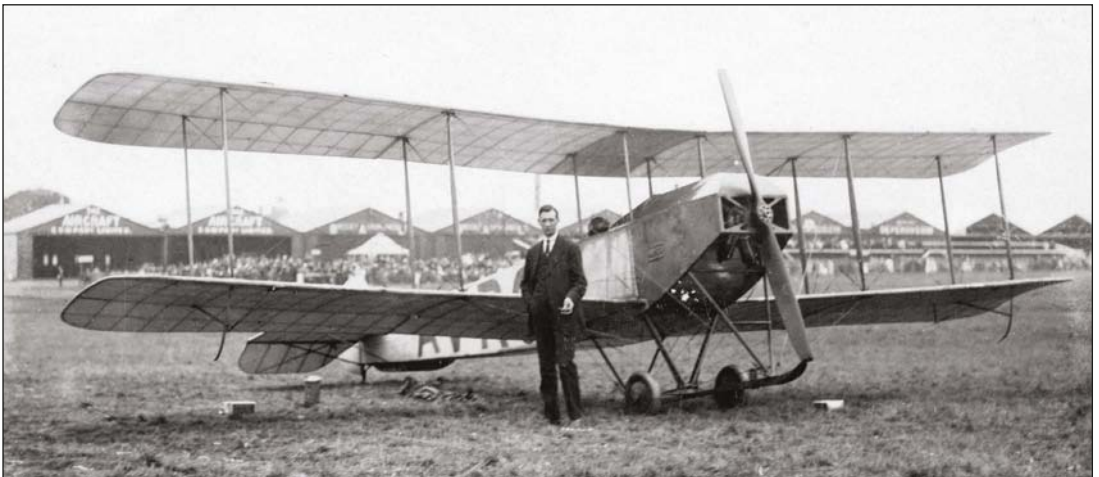
Barnwell was a great hero to me. He was more than just an instructor. He was a philosopher and friend. Frequently I sought his advice. He seemed to take a special interest in me, which is, surely, the hallmark of a good tutor. Besides, he was Vickers's chief test pilot.

One early morning — tuition took place during the calm of the very early morning or late evening — Barnwell suggested to me that if I really wanted to know how to fly I had better forego my usual afternoon siesta and watch Freddy Raynham test-fly three Avro biplanes



ABOVE Harold Barnwell, who with his brother Frank made the first powered flight in Scotland in July 1909, joined the staff of the Vickers School of Flying at Brooklands in 1912. He became chief test pilot for Vickers shortly afterwards and was killed flying the Vickers Vampire nightfighter prototype in August 1917.

BELOW Another of Lankester Parker's early inspirations was Frederick Phillips Raynham, who is seen here beside his Avro 500 at Hendon in the late summer of 1913. Raynham was only 17 years old when he gained his RAeC Aviator's Certificate (No 85) in 1911.



"I WAS INFORMED THAT MR SHORT HAD LEFT FIRM INSTRUCTIONS THAT UNDER NO CIRCUMSTANCES WAS THAT 'BIT OF A BOY' TO BE ALLOWED TO FLY..."



PHILIP JARRETT COLLECTION

ABOVE *An early example of the aviation photographer's abiding love of juxtaposing the biggest and smallest aircraft of the day, this photograph shows Eastchurch-built Short Bomber serial 9340 (right) alongside the tiny P.V.8 Eastchurch Kitten. This Short Bomber was one of many Lankester Parker flew for their Navy acceptance trials.*

which had arrived overnight at Brooklands. I was well repaid for my efforts, for Raynham calmly tested all three. With each one in turn he did a couple of loops and then, stopping his propeller at about 5,000ft (1,525m), he glided down and judged his landing so perfectly that he came to rest lined up with the other two. The Avro was a very slow and easy aircraft to fly by today's standards, but it had a good gliding angle and no flaps or wheel brakes. I think that less than a dozen people had looped at that time. It was, by any standard, magnificent flying to emulate, which was for many years my goal.

From seaplanes to Short Brothers

The prospect of pursuing a flying career seemed to end with my qualifying flight. Without substantial private means and without sufficient experience to obtain a job — had there been one to obtain — the position could not have been more hopeless. On medical grounds I could not join one of the Services.

But it did not work out that way. After a spell at Hendon on Caudron biplanes with the Hall School of Flying I decided to try my luck with seaplanes on Lake Windermere. Soon I became an instructor there, unpaid of course, under Cecil Pashley, who, for a while at the start of the Great War, was chief seaplane instructor. When Pashley left I was mainly engaged in training naval officers. I suppose it can be said I was reasonably successful, for when the Navy

decided to commandeer the school Capt Murray Sueter, "the creator of British naval aviation", introduced me to the Short brothers, with a strong recommendation that I should be given a trial as a test pilot.

I was duly engaged and joined Short's Eastchurch works in 1916. The next few months proved an uphill battle. I was still very young, just 20 to be exact, and probably looked even younger. Nobody seemed to have any confidence in me. Short Bombers, each fitted with a 375 h.p. Rolls-Royce Eagle engine, were coming off the line, but I had no authority to fly them. Oh yes, I was a member of the company; I had an office and was in receipt of regular pay, but when I suggested to the works manager that I should carry on with the trials of an aeroplane obviously ready on the tarmac, I was informed that Mr [Horace] Short had left firm instructions that under no circumstances was that new pilot — "that bit of a boy" — to be allowed to fly.

I need not enlarge on my hurt pride. Had I not been a chief instructor for a whole year? Had I not trained high-ranking naval officers to fly? True, I had not flown anything more powerful than a 100 h.p. machine, and I began to wonder whether I really could cope with the bigger jobs. But then I had considerable experience with numerous types of seaplanes, at least two of which, the Nieuport monoplane and the F.B.A. flying-boat, were generally accepted as being tricky and hazardous. So I sought an interview

with the fabulous Mr Short with the purpose of giving my notice. But the meeting did not go as I expected. It was not given to many to hold the initiative in dealing with Mr Short for long.

I was received with courtesy and a beaming smile — acres of it was my impression. There were four new aeroplanes ready for test, I was told, and I was invited to go and break my . . . neck. Whereupon Mr Short drove off in his car, no doubt to avoid being a witness of the terrible catastrophe about to take place for, despite his gruffness, he was really a very kindly and highly-strung man and I knew that, at some personal risk, he was offering me a great chance.

It was a chance I was quick to grab with both hands, and not only did I manage to fly the bombers, the largest in service at the time, but I succeeded also in putting all four through their acceptance tests in one day. This involved a good deal of flying because, as part of the trials, each machine had to be climbed to 10,000ft (3,050m) in less than 45min with a full load, which, incidentally, consisted of a pilot and observer, machine gun, eight 112lb (50kg) bombs and fuel for 8hr. It was the beginning of a long association with Short Bros.

Having won Mr Short's consent I had a still-taller hurdle to jump. The aeroplanes were destined for the Navy, which required that an officer had to be with me on the flights. The selected observers were stout sons of the sea



ABOVE During 1916–18 Lankester Parker was a test pilot for the London-based Prodger-Isaac Aviation Co. Here Clifford Prodger (left) and Bernard Isaac pose beside a Handley Page O/400 bomber circa 1918.

BELOW Salt in the slipstream — while with Prodger-Isaac, Lankester Parker was able to use his experience of seaplane-flying at Lake Windermere to test-fly Short Type 184s from Eastchurch. This glorious photograph shows Short 184 serial 8103 on the Medway in 1915.



TJA ARCHIVE



ABOVE Lankester Parker in the rear seat of the Silver Streak, Short's first venture into aircraft construction using Duralumin, an aluminium alloy first used in the construction of German airships, and later by Hugo Junkers for aircraft. Lankester Parker made the first flight of the Silver Streak, Britain's first all-metal aircraft, in August 1920.

but they did not take kindly to a new pilot, especially one who had so recently been referred to as "a bit of a boy". However, after witnessing a short solo flight, a brave Warrant Officer named Wardle decided to take a chance with me. Then I had a great piece of luck. It was the sort of good fortune one needs so desperately sometimes and so often does not get.

On the third machine I had a complete power-out at low level. I managed to make a good landing in a field in the wilds of Sheppey. We landed in the midst of a dozen or more hares who, because of our silent prop-stopped approach, had not sensed our coming, and for a moment were too surprised to move. My gallant

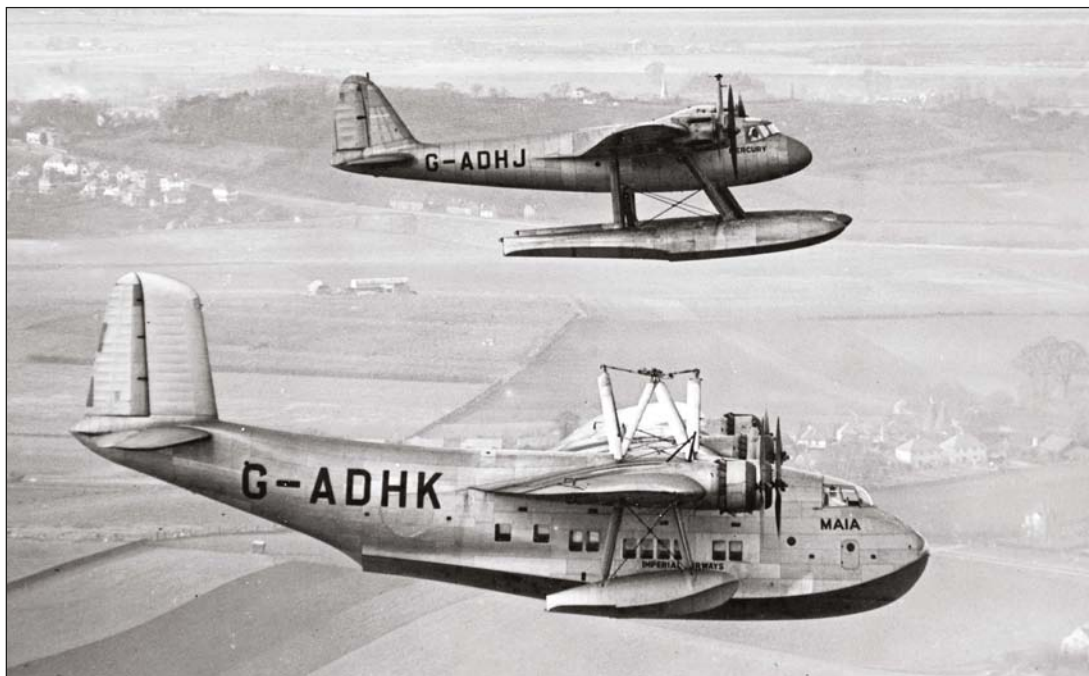
companion jumped from the cockpit before we came to rest and gave chase. It was obviously an absurd race, but I suppose it was Wardle's way of giving vent to his relief at still being alive. Having no hope of catching a hare he seemed quite content to take the second prize, a capful of mushrooms with which the field abounded. Personally, at that moment I could not raise much enthusiasm for either hares or mushrooms. But I had no further trouble with observers.

Many months were to pass before I confessed to Wardle that the field in which I landed so skilfully was three fields further on than the one I had selected originally. I suspect that Wardle knew all the time.

The Short S.538, nicknamed Shamrock, was a development of the Shirl torpedo-bomber, and was built specially for an attempt on the first non-stop transatlantic flight. It suffered engine failure on its way to Ireland in April 1919, however, and by the time it had been repaired Alcock and Brown had made their historic Vickers Vimy flight that June.

PHILIP JARRETT COLLECTION





ABOVE On February 23, 1938, Lankester Parker was at the controls of Maia, the lower component of the Short Mayo Composite, for the second successful separation of the “pickaback” aircraft. Harold Piper was flying the upper component, Mercury. The idea showed some promise but the outbreak of war stymied its development.

After two years, during which much of my time was occupied in freelance test flying in partnership with an American, Clifford H. Prodger, I became Short’s chief test pilot, a position I held for 28 years. They were most entertaining years, and I had the experience of many interesting aeroplanes and witnessed many great developments.

The Shamrock and Mayo

Of the many trials I was called upon to make during that long period I consider the most hazardous was the full-load trial with the Short S.538, named *Shamrock*, in 1919. The *Shamrock* was built specially to compete for the *Daily Mail*’s £10,000 prize for the first direct flight across the Atlantic, destined to be won by Alcock and Brown. With only 275 h.p. from the derated Rolls-Royce Eagle VIII engine, *Shamrock* carried two people, wireless equipment, emergency rations and 475gal of petrol, resulting in nearly 30lb (14kg) for each available horsepower.

As was to be expected, it proved extremely sluggish on take-off. Although I allowed myself every inch of the longest run at Eastchurch when test-flying the aircraft in April 1919, I was not properly airborne when I arrived at the boundary ditch. I managed to clear it in the manner of a fox-hunter and kept going, crossing three more ditches in similar style. Then, to my great relief, I found myself over the sea, just a few feet above the surface and with precious

little control. Bit by bit the speed increased and, finally, I was able to climb to 6,000ft (1,830m) and get back to Eastchurch. Who can blame me if I was a little curt with some cameramen who grumbled because I did not land nearer them?

My most elaborate trials were with the Mayo Composite “pickaback” aircraft, in company with Harold Piper. We were faced with many problems, some stupidly simple, some fundamental. The first was to start all eight engines in the short period allowed us by the Medway tide. The next was to find an intercom system that lived up to its name despite the intense noise. We learned a great deal from that aircraft, especially with regard to accuracy of performance measurement. It was, we felt, desirable to fly each component accurately at the speed and height we had decided for our first separation test, to get the correct trim and power requirements. This involved some elaborate “position error” trials for the purpose of calibrating the speedometer readings.

All aeroplanes need a correction factor for their speedometers, but our aircraft needed two each, the factor being very different when flying as individual monoplanes than when flying together as a biplane. Another interesting point, and one that brought other complications, was that much more power was needed to fly the combination than the two parts individually at the same weight and speed. Surely a pointer to monoplane efficiency and its modern vogue.



ABOVE A splendid photograph of John Lankester Parker standing on the port float of the first Short Scion Senior, VT-AGU, moored in the Medway before its delivery to the Irrawaddy Flotilla Co in Rangoon in January 1936. Lankester Parker flew every Short prototype on its maiden flight until his retirement from test flying in 1945.

The other difficulty which had not been forecast caused us some anxiety. It seems it is fundamental that when two perfectly balanced aeroplanes are attached together the combined unit will almost certainly be out of trim whatever their relative positions. Accordingly one must accept having either the combined unit out of trim at the moment of parting, or one (or both) of the individual units out of trim immediately after parting. I chose the latter condition — the combined unit in trim at parting, the upper component in trim after parting, while all the change of trim owing to the separation had to be coped with by the lower component. In the event this proved to be successful. The very large change of trim did not happen instantaneously as I had expected, but allowed me time to make the necessary adjustments.

My most rewarding trials were in connection with the famous Short flying-boats, the Empires for civil use and the military Sunderland. Many well-informed people believe that the former were responsible for really putting British civil aviation on the world map for the first time. In terms of performance, economy and passenger

appeal, the Empires had no serious competitors at the time. Hundreds of Sunderlands were produced during the war, and an account of its distinguished record, in particular against enemy submarines, and the drama surrounding the many stories of gallant rescues of stricken seamen, snatched sometimes from the roughest seas, would of itself fill a volume.

The test-pilot's lot

Looking back over the years two things in particular stand out in my mind. First, at least during the earlier part of my test flying, was the personal loneliness which was in such contrast to my instructor days. I always seemed to be alone, or in strange places where I knew nobody intimately. Unlike the Service pilot, I was not a member of a squadron, and so had no pal with whom to discuss my problems and fears. Much of the flying was alone and at a high altitude.

The second point is the incredible number of forced landings with which I have been confronted. The very fine standard of reliability of the modern engine, and of its installation, fuel supply and so on, has gone a very long

way towards the complete elimination of the type of emergency I mean. Literally scores of times I have had an engine die on me. Even with the slow landing speeds associated with that period, the sudden cessation of noise and the inevitable consequence of a heartburning search for somewhere to land, was always a shock and sometimes very frightening.

My most alarming experience was in 1917. I had, I think, become a little conceited at my ability to fly through cloud. I took off from Manston in a Short Bomber with the intention of climbing to 10,000ft (3,050m). There was complete cloud cover at 1,200ft (365m), but I expected to break into clear air, as I had done so often in the past, at between 2,000 and 3,000ft (610–915m). This time I had misjudged the weather, however, and at 6,000ft (1,830m) I was still in cloud. I was desperately tired and my concentration was beginning to fade, so I was forced to attempt something entirely new to me; to change from climb to glide in cloud. And I was not very successful. What happened in the next few minutes was in the nature of a nightmare only vaguely to be remembered.

There were no blind-flying instruments in those days so cloud-flying could be done only by a kind of trickery. I had developed a technique of my own which consisted of jamming the rudder

bar with my feet against the side of the cockpit and under no circumstances to let it move. Every half minute or so I would glance at the compass and, as a corrective for any indicated change of course, would apply a little aileron. Inherent lateral stability had to look after the rest.

Although this method worked reasonably well for cruising, climbing or gliding — provided I could maintain the conditions in which I entered the cloud — it did not permit me to change from, say, climb to glide in cloud which, on this particular aeroplane, demanded a big change of rudder position. The aeroplane must have done the most incredible manoeuvres during the next few minutes. Pulling the control stick back in an attempt to check the increasing speed had the opposite effect and when, in due course, the speed equally rapidly decreased, pushing the control forward only hastened a violent stall.

In the end I came out of the side of a mountainous cloud and, to my great relief, saw the sun. My first impression of the sun was that it too had gone mad, for it seemed to be tearing across the heavens, but almost instantly my sense of movement was restored to me and all was well. I was still faced with having to descend through 1,000ft or so of cloud and although I tackled that problem with something less than my usual confidence, I had no further difficulty.



Lankester Parker made the maiden flight of the first Short S.23 Empire Flying Boat, G-ADHL, on July 3, 1936, and later recalled that working on the company's big flying-boats — the Empires and the military Sunderland — was the most rewarding experience of his 28-year Short Bros career.

TAH ARCHIVE

NEXT TIME

In the next instalment of *Echoes from Dawn Skies*, Cecil Pashley recalls how he and his brother Eric designed and built their own racer to win the 1914 Brighton Cup — twice!

MERLIN MAGIC at FARNBOROUGH

In 1962 the SBAC Show at Farnborough celebrated 50 years of British military aviation with a special display of vintage aircraft. **KENNETH BROOKES** had a prime position by the runway and took these magnificent — and previously unpublished — photographs


THE 1962 SBAC Show at Farnborough offered something slightly different from the usual rip-snorting high-adrenaline state-of-the-art jet fighter displays to which visitors had grown accustomed over the previous decade. The ear-shredding military hardware — Hunters, Lightnings, Gnats, Scimitars, Sea Vixens etc — was there of course, as were other representatives of the British aircraft industry, from Ken Wallis's diminutive gyrocopter to the RAF's capacious turboprop-powered Argosy. What was different, however, was the addition on the public days of a special vintage display celebrating the 50th anniversary of the formation of the Royal Flying Corps in April 1912.

Taking part in the commemorative display was a selection of nine aircraft representing the considerable achievements of British military aviation — not forgetting those of the Senior Service too of course — over the previous five decades. The aircraft were: Royal Aircraft Factory S.E.5a D7000 (flown by Gp Capt Pat Hanafin); Bristol F.2B D8096 (Mr J.I. "Willie" Williamson); Hawker Hart "J9933"/G-ABMR (Duncan Simpson); Fairey Swordfish LS326 (Lt-Cdr Peter "Lofty" Wreford); Gloster Gladiator "K8032"/G-AMRK (Peter Varley); Hawker Hurricane PZ865/G-AMAU (Bill Bedford); Supermarine Spitfire LFVB AB910/G-AISU (David Morgan); Fairey Fulmar N1854/G-AIBE and de Havilland Mosquito T.3 TW117.

The last two were flown by Lt-Cdr Trevor Spafford and Civilian Anti-Aircraft Co-operation Unit pilot John Oliver respectively, the pair lining up together on the runway's "piano keys", where keen photographer Ken Brookes was in his usual position waiting with Kodachrome-loaded camera for the perfect moment. Ken explains:

"Those were the days when we could go right to the edge of the runway to get dramatic pictures. It stopped when an aircraft crashed on the other side of the runway and a famous American aviation photographer ran across the runway to get close-ups. After that they kept us back to a line halfway between the runway's edge and the public line".

In 1962 Ken was perfectly positioned to capture the pair of Rolls-Royce Merlin-engined "old boys" as Oliver and Spafford performed last-minute checks and engine run-ups before launching into a lively display in front of 82,000 people; the Mosquito rolled off its marks on the runway first, the Fulmar following hot on its heels.

So it was that Ken Brookes was in the right place at the right time to capture these magnificent images of the splendid and nostalgic parade of vintage aircraft at Farnborough in 1962. Even if only for a short while, the usual high-pitched whistle of the turbojet, the screaming afterburner, the efficient hum of the turboprop and the beating of turbine-powered rotor blades were all replaced by the majestic roar of three Rolls-Royce Merlins. 

Fairey Fulmar N1854 was the first production example and made its first flight in January 1940, after which it was used for trials, including deck landing trials aboard HMS Illustrious. After the war it was returned to Fairey and registered G-AIBE. In 1972 it was presented to the Fleet Air Arm Museum, where it resides today as a static exhibit.

KENNETH J.A. BROOKES © 2014





Ken Brookes's superb image of de Havilland Mosquito T3 TW117 and Fairey Fulmar N1854 on the runway at Farnborough on September 7, 1962. Built at Leavesden in May 1946, TW117 was put into storage, where it remained until July 1947. After serving with various second-line units, it was put into storage again in April 1954, where it remained until March 1960, when it joined No 3 Civilian Anti-Aircraft Co-operation Unit at Exeter Airport. Coded "Z", the Mosquito was still serving with No 3 CAACU when it was flown by John Oliver as part of the vintage display at Farnborough in 1962. It was retired and handed over to the RAF Museum Collection in June 1963, and was used for the filming of 633 Squadron at Bovingdon the following month. It was subsequently put on display at the RAF Museum at Hendon, before moving to the Norwegian Air Force Museum in Oslo, where it is currently on display.



PLAN



**America's Unbuilt Spyplanes — Part One:
The British Connection **Randolph Rae and the
REX hydrogen-engine projects****

*Kelly Johnson's famous U-2 and SR-71 spyplanes represented the apex of the USA's ability to spy on its Cold War enemies using aircraft that could operate well beyond the reach of Soviet defences. **Dr DAVID BAKER** introduces a series on America's unbuilt spyplane projects with the story of Randolph Rae, the British engineer whose ideas on hydrogen-powered aircraft were a major influence on the legendary Lockheed designer*

DURING THE FIRST half of the 1950s the American aircraft industry was tasked with a wide range of challenging possibilities. Many of these emerged from requirements predicated on the deepening Cold War with the Soviet Union; some because new information about high-speed flight and exotic chemistry promised unprecedented performance. It was to be a combination of both of these that gave rise to one of the more fantastic of these possibilities, when research began into a high-altitude supersonic reconnaissance aircraft propelled by hydrogen-fuelled engines.

The possibility of using hydrogen technology grew from an unsolicited proposal by famed aircraft designer Clarence "Kelly" Johnson early in January 1956. Johnson offered to build a successor to his subsonic Lockheed U-2 spyplane, development of which had begun almost three years earlier. It would be several years before the U-2 became operational but Johnson was already looking to the time when it would become prey to increasingly sophisticated Russian air defences.

Johnson had become familiar with hydrogen as a fuel when he was involved in developing design studies for another project a couple of years earlier; one which opened the possibility of a completely new way of powering high-speed, high-altitude aircraft. The idea had come from a very unlikely source.

THE BRITISH ARE COMING . . .

On March 24, 1954, British designer and engineer Randolph Samuel Rae turned up at the security office of the USAF's Wright Air Development Center (WADC) at Wright Field, Ohio, briefcase under arm, with an appointment to see key personnel in the Development Projects office. He had a proposal that had already garnered some attention from the USAF, and his visit to Wright Field was at the behest of Col Donald H. Heaton, who was certain that Rae had an ingenious solution to a persistent problem.

Born on Boxing Day, 1914, Rae was one of those very British boffins without a sense of importance for his own genius, but passionate about the possibilities of his inventions. Schooled in Switzerland, Rae had focused on marine science, working for four research and development groups at the Admiralty between 1939 and 1948,

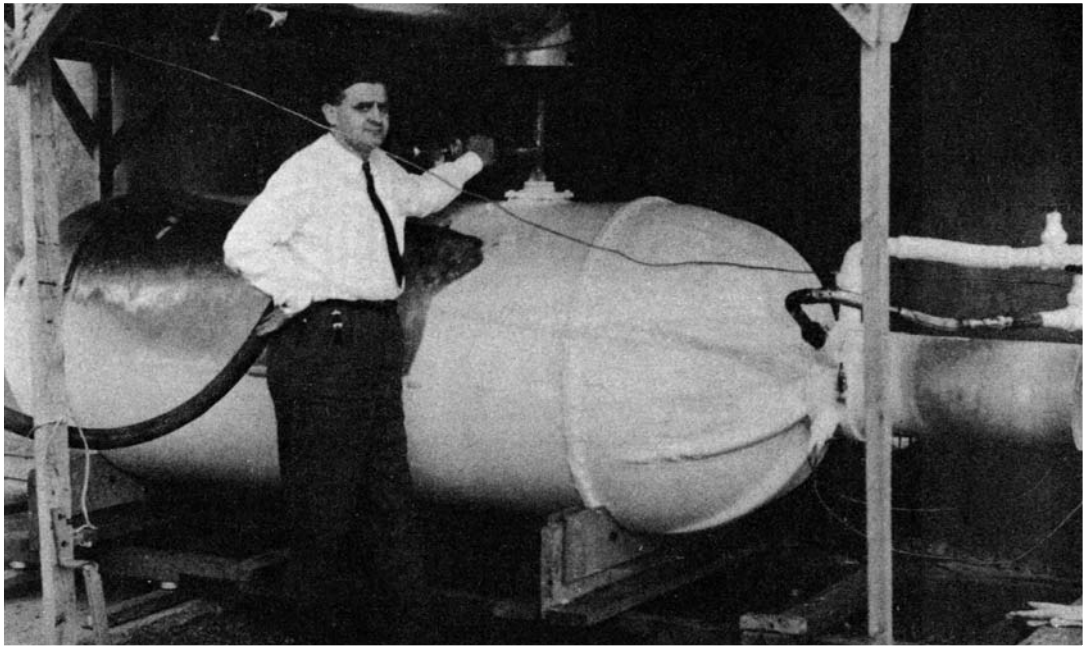


ABOVE One of the most prolific and innovative aircraft designers in history, Clarence "Kelly" Johnson joined Lockheed in 1933 as a tool designer, and went on to design numerous aircraft for the company. **OPPOSITE PAGE** A classic Cold War image of American military planners devising ways of obtaining up-to-the-minute intelligence on Soviet strength.

and then with the Applied Physics Laboratory of Johns Hopkins University in the USA.

It was at the last-named that he focused on aerodynamics and ramjet engines before taking on project development of a new guided-missile system. While wrestling with the knotty problems associated with gyroscopes and mechanical feedback systems, Rae started thinking about possible solutions to the missile's speed/altitude dilemma. The cruise-type missile was to be powered by a ramjet engine. The jet engine is efficient at relatively slow speeds but limited in altitude by reduced atmospheric pressure. Conventional rocket engines are very efficient at high-speed flight, but inefficient at slow speeds. In wrestling with these problems he was attracted to the idea of subsonic flight at very high altitude, and devised a way to get around the problem of

ALL IMAGES VIA AUTHOR UNLESS OTHERWISE STATED



ABOVE A poor-quality but extremely rare photograph of Randolph Rae conducting a hydrogen tank test in 1955. Although the theory of using hydrogen to power aircraft is sound, the relatively inefficient method of producing it with current technology has made it expensive in comparison to fossil fuels — a major obstacle to its adoption.

reduced air density: provide very large propellers driven by a small rocket motor operating as a gas turbine. Rae calculated that by using hydrogen and oxygen as propellants for the turbine he could provide propulsion for an aircraft operating much higher than ever considered practical for an air-breathing engine, be it reciprocal or reaction-powered. Both fuel and oxidiser would be carried integral to the airframe, to eliminate the need for the aircraft to take in oxygen as it flew.

But this was not the kind of work encouraged at the Laboratory. Captivated by the possibilities, in the summer of 1953 Rae left Johns Hopkins to develop this idea, teaming up with his friend Thomas Summers of the Summers Gyroscope Company, a manufacturer of gyroscopes and guidance systems, which could provide financing and legitimacy. In mid-December Rae recruited Homer J. Wood, late of the Garrett Corporation, with which he had been working on gas turbines.

By early March 1954 Rae had visited the USAF's Air Research & Development Command (ARDC) at its headquarters in Baltimore, Maryland, to explain his idea to Donald Heaton, chief of the aeronautics and propulsion division, and to Lt-Col Langdon F. Ayers, who ran the propulsion branch. Established in 1950, the ARDC was the USAF's centre for research and development, set up to balance short-term operational needs with long-term advanced weapons development. It was here that Rae's ideas found a receptive audience and from where he was directed to the WADC for the meeting on March 24, 1954.

Under normal peacetime conditions the procedures for getting new inventions reviewed would have been laborious and daunting. Money was always important for conducting preliminary tests, and a company to back the idea was vital. The government did not like lone inventors, who were unexposed to the discipline of corporate bureaucracy. Rae had the latter securely under his belt and could confidently market his idea, all credentials at hand. In ordinary times there would still have been resistance to boldly innovative or even radical new technologies. But these were not ordinary times. This was an age of unprecedented military expansion.

A CALL TO ARMS

In 1944 American military aircraft production peaked at 96,318 airframes, declining to 49,761 the following year. Post-war demobilisation had cut the annual production rate to 2,500 airframes by 1948, but increased international tension was responsible for raising that to 5,000 in 1951 and to almost 9,000 by 1953. A year later, in the month that Rae met with Col Heaton, Secretary of the Air Force Harold E. Talbott ordered full-scale development of America's first intercontinental ballistic missile (ICBM), the Convair SM-65 Atlas, and followed this with approval for its back-up, the Martin SM-68A Titan.

The American defence budget was increasing at an unprecedented rate, from just over 30 per cent of government spending in 1950 to nearly 70 per cent by 1954. The entire American economy was



ABOVE *Harold Elstner Talbott served as the US Secretary of the Air Force from February 1953 until August 1955, and played an important role in expanding the mandate of the USAF during the Cold War.*

RIGHT *A massive escalation in American military spending in the mid-1950s heralded a new age of intercontinental ballistic missiles (ICBMs). The Atlas was the USA's first ICBM, and first flew in June 1957.*



now based around the defence industry and there was money to spend on exotic and even highly improbable concepts. The root of this surge lay in global tensions between competing ideological systems — but the military was receptive to new technologies for a very surprising reason.

Although World War Two had clearly been won by overwhelming manpower and unprecedented levels of munitions production, the myth arose quickly in the USA that it would be quality of weapons that would decide the outcome of the next global conflict, despite the clear reasons why the Allies had defeated Nazi Germany and Imperial Japan. But the fact that this myth became entrenched opened doors ordinarily closed to new ideas and innovative technology; it had forged a unique alliance between scientists and the military, and it was to the former that the latter turned when pressure once again forced a new arms race, which is why Randolph Rae was able to obtain his ticket into the WADC.

The WADC had been set up by the ARDC in early 1951 as a facility where new weapon systems, airborne and ground elements and new materials could be developed. It was one of ten such facilities under the aegis of the ARDC, but it was exactly the place where Rae wanted to be to present his radical idea. On that cold March morning in 1954, he was but one of many who would be processed through the security gate to dozens of offices where USAF officials would sift the many ideas coming through. And the USAF had the money to follow through on them. The

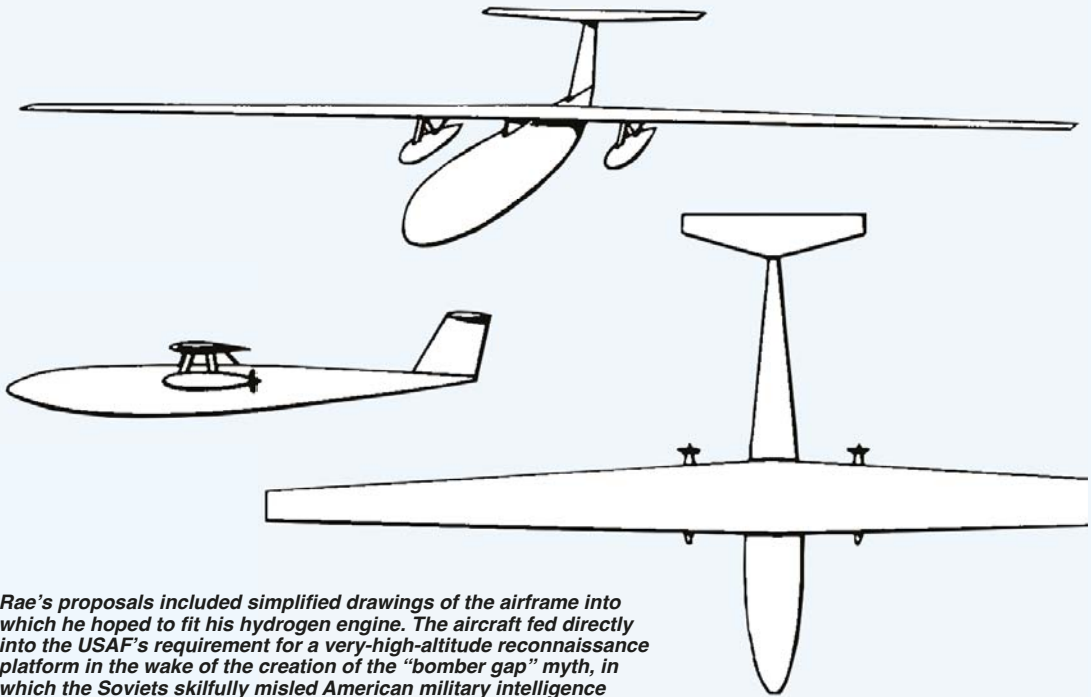
budget for USAF research and development had grown from \$62.3m in 1950 to \$460.5m in 1953.

Wright Field was vast and full of “No Entry” doors that required access keys. But for the 39-year-old British engineer it held no fears, only opportunities. Rae laid out a set of documents on a long table facing a group of specialists, all of whom received a brochure dated February 1954, each with the title *REX-I: A New Aircraft System* neatly typed on the cover above the name of its author, “R.S. Rae, Summers Gyroscopes”.

AUDITIONING THE CONCEPT

The real innovation in Rae’s proposal was for the hydrogen/oxygen gas-turbine engine which would drive a propeller-powered aircraft, but the brochure contained details not only of the unique method of propulsion but also of the airframe itself. Rae proposed a high-lift airframe with low wing loading, a maximum take-off weight of 72,000lb (32,660kg) and wing area of 4,671.5ft² (434m²). Rae calculated that, powered by a 2,400 h.p. engine, the REX-I would have a range of 6,215 miles (10,000km) and a ceiling of 85,300ft (26,000m). At that altitude, cruising speed would be 400–500 m.p.h. (640–800km/hr).

Faced by a circumspect group of listeners, Rae solemnly and modestly went through what he considered a truly innovative way to achieve flight at very high altitude. A height so great that the amount of oxygen ingested by a conventional jet engine ran out of pressure before the high-lift wing ran out of molecular atmosphere within



Rae's proposals included simplified drawings of the airframe into which he hoped to fit his hydrogen engine. The aircraft fed directly into the USAF's requirement for a very-high-altitude reconnaissance platform in the wake of the creation of the "bomber gap" myth, in which the Soviets skilfully misled American military intelligence analysts into wildly overestimating the number of nuclear bombers Russia had on strength. Hard facts were needed — and fast.

which to keep the aircraft stable. It was the engine that gripped the specialists at Wright Field and they listened as Rae described how it would work.

The compact engine itself was designed around a three-stage turbine on a common shaft, with a small combustion chamber attached ahead of each stage. Separate liquid-hydrogen and oxygen tanks provided pump-driven propellants, with all the hydrogen and some of the oxygen being delivered to the first-stage combustion chamber. This produced a gas with a temperature of 1,520°F (827°C), which was about the highest that could be tolerated by the turbine materials of the day. The gases were then passed to the second combustion chamber where additional oxygen was added, increasing the burning process with those products delivered to the second stage. The third and final stage was similarly re-heated with injected oxygen.

After emerging from the stage-three turbine the spent gas would pass to a heat exchanger with an initial pressure of 69.7 atm (1,024lb/in²) to heat the cryogenic propellants from the tanks for delivery to the first stage, the spent products then being vented overboard. Rae had selected hydrogen for its high specific heat, low combustion temperature and high energy efficiency. Calculating potential from a four-stage turbine, Rae believed this engine would deliver a propellant consumption of 1lb/h.p./hr (0.61kg/kW/hr) and it was this potential from a compact, simple design that interested the specialists at Wright Field.

REX-I AIRFRAME DATA

THE FIGURES BELOW are all speculative and are taken from the brochure *REX-I: A New Aircraft System* by Randolph S. Rae, Summers Gyroscope Co, February 1954

Dimensions		
Wing area	4,671ft²	(434m²)
Weights		
Empty	36,000lb	(16,330kg)
Max take-off	72,000lb	(32,660kg)
Performance		
Cruise speed	400–500 m.p.h.	(640–800km/h)
Take-off speed	70 m.p.h.	(113km/h)
Service ceiling	85,300ft	(26,000m)
Normal range	6,215 miles	(10,000km)*

* When empty the REX-I would be able to glide an additional 1,000km

The brighter scientists of the early 1950s already knew the advantages of hydrogen as a fuel. Boeing's J.M. Wickham calculated that the range of a hydrogen-fuelled aircraft would be 30 per cent greater than one powered by hydrocarbons. Others had designed hydrogen-powered turbo-rockets using principles acquired from German work on axial-flow compressors driven by decomposed hydrogen peroxide (producing steam). In 1946, William C. House described a turbo-rocket where bi-propellant rockets were placed aft of the compressor and upstream of the

Randolph Rae's REX-I engine: reaching for the stratosphere

How the engine would have worked without the need for atmospheric oxygen:

1 The propellants hydrogen and oxygen – stored cryogenically in liquid form – are pumped from tanks in the aircraft to the engine.

2 The fuels pass through a heat exchanger which raises their temperature.

3 All of the hydrogen and some of the oxygen is delivered to the first combustion stage.

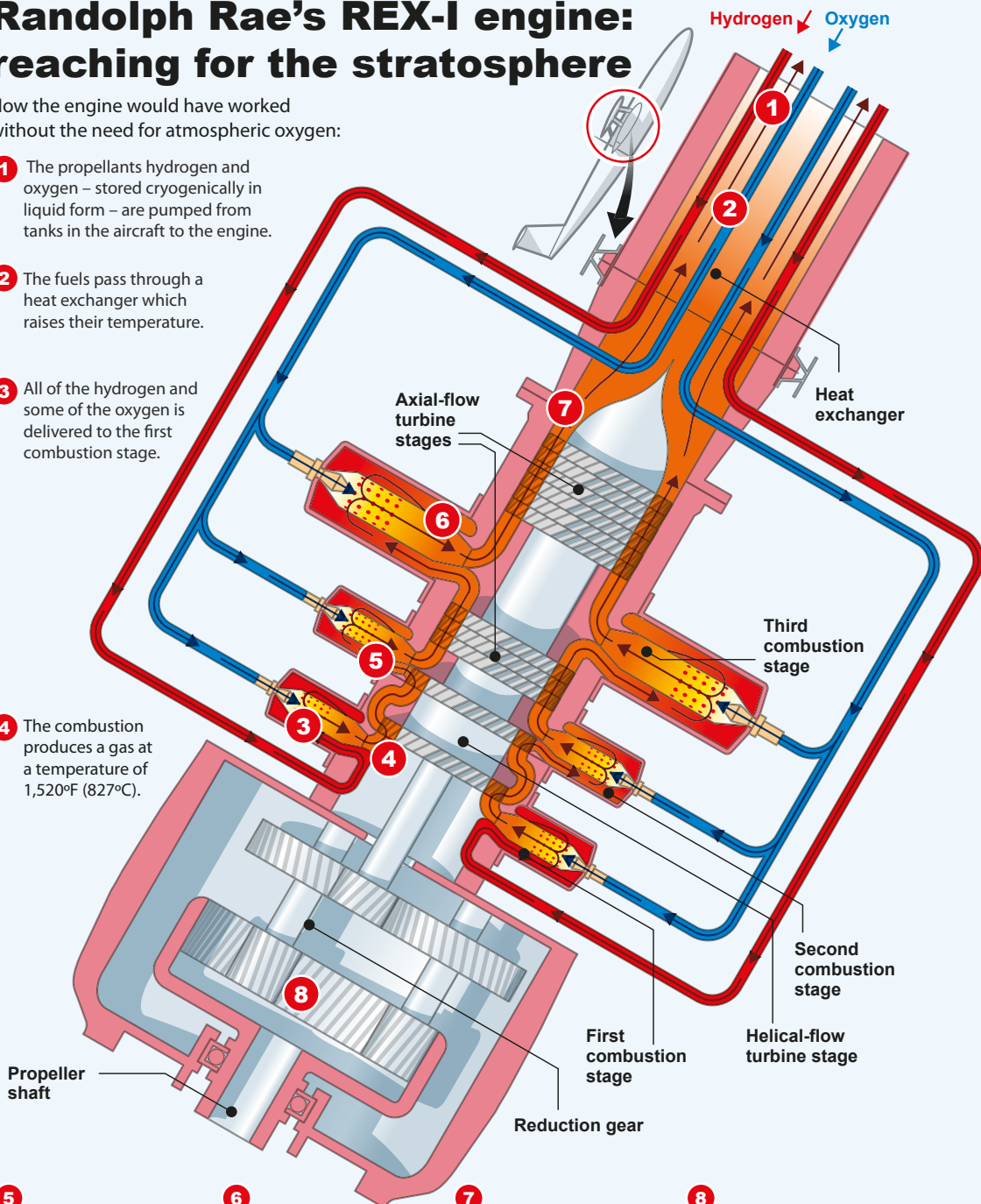
4 The combustion produces a gas at a temperature of 1,520°F (827°C).

5 The gas drives the helical-flow turbine and passes to the second combustion stage where more oxygen is added, increasing the burning process.

6 The gas then drives the first axial-flow turbine stage before passing on to the third combustion stage where the process of adding oxygen is repeated once again.

7 After driving the second axial-flow turbine the spent gas then passes through the heat exchanger, supplying the initial heat for the fuels before venting to the rear of the aircraft.

8 The turbines power the aircraft's propellers via a reduction gear mounted on the engine.



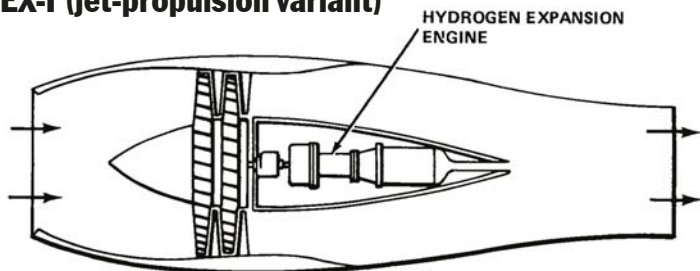
Graphic: Ian Bott www.ianbottillustration.co.uk

REX APPEAL

The evolution of Randolph Rae's hydrogen-engine projects

THE ORIGINAL REX-I concept was for Rae's hydrogen expansion engine to drive a propeller shaft, but he quickly devised a modified system in which it was placed at the heart of a pure reaction powerplant. Atmospheric air would be admitted to the unit via an intake and compressed by a two-stage compressor, which was driven by a turbine within the hydrogen expansion engine. This would be developed even further with the addition of an afterburning system in the REX-II and REX-III variants.

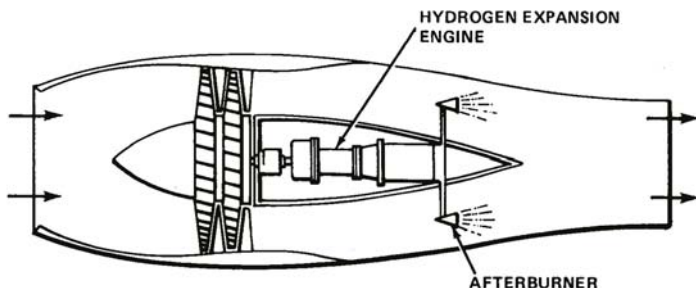
REX-I (jet-propulsion variant)



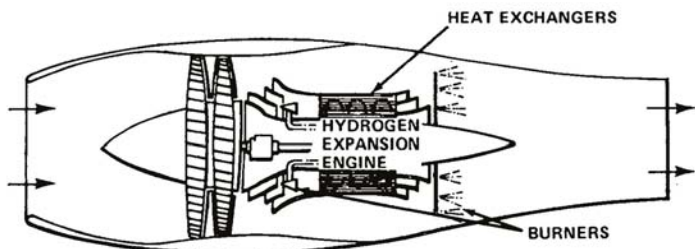
This is the revised REX-I adapted for jet propulsion rather than driving a large-diameter propeller. The system incorporates a two-stage compressor, with the compressed atmospheric air expanding via the exhaust nozzle to provide propulsive thrust.

REX-II

With additional fuel injected into the exhaust efflux, the REX-II system incorporated subtle modifications that leaned more towards already-extant research into afterburning on conventional jet engines.

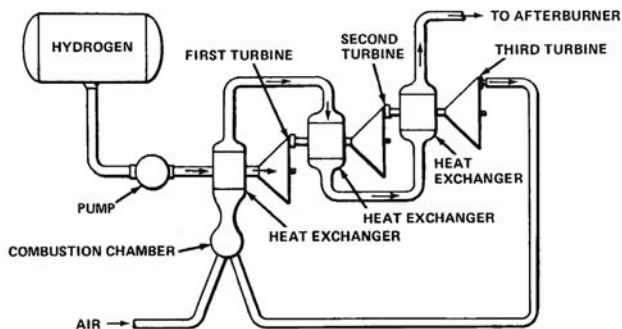


REX-III



In Rae's REX-III system, the heat from hydrogen preheated from burning with air in the heat exchangers is transferred to hydrogen fed to the combustion chambers and drives turbines, the exhausted products of which are added to the jet flow to augment thrust.

RIGHT This diagram outlines the principles of operation of Rae's final iteration of the REX-III, which incorporated a much more sophisticated and more efficient arrangement than his earlier REX-I configuration. The revised REX-III system avoided the need for a dedicated oxygen supply and used only heated hydrogen to drive the turbines.



turbine for accelerated flow into the burning stage.

Rae's ideas were of moderate interest at Wright Field but of greater significance higher up the chain. In August 1954 Col Paul Nay at the ARDC evaluated the concept and found in it a means of satisfying the accelerating urgency for a very-high-altitude reconnaissance aircraft. Kelly Johnson had been touting his CL-282 spyplane concept around Washington DC, but had received little support from the USAF, if only because its proposed General Electric J73-GE-3 turbojet engine, untried and untested, was considered inadequate at high altitude.

Johnson had delivered a package of his CL-282 materials to John Seaberg, assistant chief of the New Developments Office at Wright Field, on May 18, 1954, but despite his stellar reputation built on his development of numerous innovative aircraft, the proposal was rejected. Looking elsewhere for a buyer, Johnson visited the Central Intelligence Agency (CIA) and Dr Joe Charyk, who was tasked by CIA Director Allen Dulles with finding an asset capable of conducting clandestine photo-reconnaissance of the Soviet Union to determine whether or not it was engaged in a major missile development, test and production programme.

The last few months of 1954 were to see rapid approval for the CIA to develop what was code-named *Aquatone*, headed by Richard Bissell and ultimately known as the Lockheed U-2. Johnson was told to redesign the CL-282 with the more promising Pratt & Whitney J57-P-37 engine, a project approved and funded by authorisation of President Eisenhower, to be operated by the CIA but with the USAF expected to acquire some examples in due course. A full cover story was set up assigning responsibility to the National Advisory Committee for Aeronautics (NACA), giving the project recognition as a "scientific tool for atmospheric research".

While the CIA was acquiring its very own spyplane, the USAF was busy planning for a much more ambitious system. On November 27, 1954, the ARDC capitalised on a three-year study from the RAND Corporation and approved the development of a military reconnaissance satellite, which it explained would be for "cold-war politico-psychological advantage". This would be developed as Weapon System WS-117L, codenamed *Corona* and publicly known as the *Discoverer* series of "scientific research" satellites when it emerged in 1959. But, after eight years of clandestine overflights of the Soviet Union using converted World War Two bombers, the USAF still sought its own dedicated spyplane. It was for this duty that Randolph Rae's REX-I showed promise, and the men in blue wanted to move in on the high-altitude reconnaissance game.

The sticking point was credibility; the USAF

needed to know there was muscle behind the paperwork. Rae and Summers sounded out Garrett, which discreetly vouched for the REX-I team with the USAF before moving to acquire the engine, lending the project greater credibility.

A SIDWAYS SHIFT

Part of the price Rae and Summers paid for selling out to Garrett was the marginalisation of the latter company by the ARDC, which thought it too inexperienced to integrate the many systems necessary to make the project work. Usual practice was for the USAF to let a prime contract for the airframe to an aircraft manufacturer and a separate contract for the engine. But Rae, Summers and Garrett wanted the whole package — and that had never been made to work.

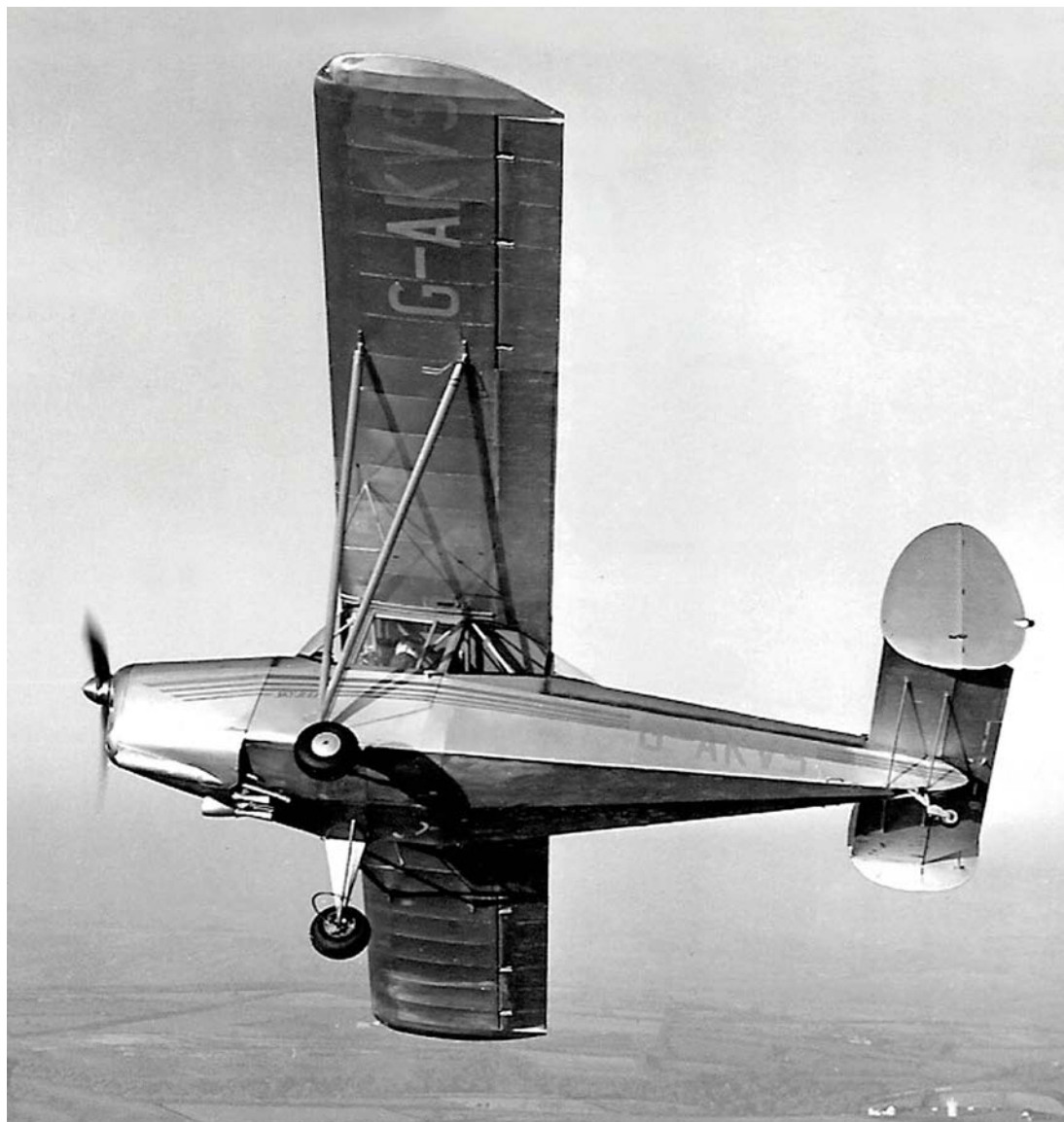
Throughout 1955 negotiations and revised concepts staggered along, while the powerplant laboratory at Wright Field undertook tests on hydrogen and a wide range of other propellants. Colonel Norman P. Appold ran the engine laboratory at Wright Field and was well acquainted with Rae's REX-I concept. Kelly Johnson was having serious problems with the low-volatility brand of JP-4 fuel used to run the J57 in the U-2. At high altitude, elements of the fuel boiled away out of the vents, depleting the load and reducing range. Appold was appointed to solve the problem. During their close working relationship on the fuel boil-off problem, Appold told Johnson about REX-I. Lockheed had been contracted to perform airframe analysis for the turbo-rocket engine and was already familiar with its unique qualities.

The writing was on the wall. Frustrated at not being able to persuade the USAF to let him build the entire aircraft, Rae proposed REX-II, a variant in which the hydrogen gas from the turbines was burned in the air behind the efflux, and a REX-III which was completely different again. In this, heated hydrogen alone was used to power the turbines with the hydrogen burning with air to provide the power for the initial function.

By the end of 1955 the project was outgrowing the ideas of the unassuming Randolph Rae, who dreamed of revolutionising high-altitude flight. In addition, the requirement for a USAF successor to the CIA's U-2 had outgrown the capabilities of Rae's REX engines. Talk was turning to a supersonic spyplane with extraordinary capabilities; and it was with this idea that Kelly Johnson turned up in January 1956 with his unsolicited proposal for a hydrogen-burning aircraft, far beyond anything Rae could imagine — but inspired by the work of the quiet little Englishman.



In Part Two of America's Unbuilt Spyplanes:
Kelly Johnson and the top-secret Suntan project



CHRISLEA SKYJEEP G-AKVS / IMAGES VIA RICHARD T. RIDING COLLECTION UNLESS OTHERWISE NOTED

the **aeroplane** that flies itself *

RICHARD T. RIDING chronicles the evolution of the Chrislea family of British light aircraft. Established with the Airguard of 1938, it continued after the war with the development of a series of versatile four-seaters, sales of which were blighted by the company's decision to incorporate a novel — but unpopular — flight control system

* **chrislea sales brochure, 1947**

THE CHRISLEA AIRCRAFT COMPANY LIMITED



BETWEEN THE TWO world wars, light aviation in Britain — particularly during the 1930s — blossomed to new heights following the depression years of the late 1920s. Established aircraft manufacturers such as Avro, Blackburn, de Havilland, Miles, Percival and Westland dominated the touring and club aircraft market, producing new models almost every year until war brought further development of civil aircraft to a standstill. For every established company producing light aircraft, two or three smaller organisations were trying to muscle in on a potentially lucrative world market. Companies like Comper, Dart, Parnall, Heston, Simmonds Spartan and a host of other two-man bands strove to hit the jackpot. Most failed, either from lack of financial investment or because their designs were not up to the mark.

Paradoxically, during the late 1930s, the ever-growing threat of war in Europe fostered a demand for pilots and cheap training aircraft, and to this end the Civil Air Guard (CAG) was created in 1938. It was the brainchild of Capt Harold Balfour (later Lord Balfour of Inchrye), Under Secretary and Secretary of State for Air. A completely civil organisation, the CAG was independent of the RAF, controlled by representatives of the flying clubs involved in the scheme. Its purpose was to train a reserve of pilots as cheaply as possible. With the prospect of

learning to fly for 2s 6d per hour the scheme was an overwhelming success, and by the end of the year thousands of applicants and 75 flying clubs had signed up. But there was a severe shortage of cheap suitable training aircraft. This shortage set a challenge for the aircraft industry and initially many types of existing aircraft were put forward to fill the role.

ENTER THE AIRGUARD

One contender for this potentially lucrative market was from a small company set up in October 1936 by Richard Constantine Christoforides (1915–67), with Bernard V. Leak (1907–47) as designer. Ironically, Christoforides, the son of a wealthy cigarette manufacturer, had a fear of flying.

The Chrislea Aircraft Company Ltd first occupied premises in Camden Town, London, where work soon started on a conventional wooden side-by-side two-seat low-wing cabin monoplane. The engine was a 62 h.p. Walter Mikron II, for which Chrislea had obtained sole manufacturing and distribution rights from the Czechoslovakian maker.

The Airguard, as it was named, featured a deep

BELOW *Designed to meet the specifications issued by the Civil Air Guard for a cheap and simple aircraft with which to train civilian reserve pilots, the cunningly named Chrislea LC.1 Airguard was completed in the late summer of 1938 and registered G-AFIN. Its foreign engine precluded its selection and only one was built.*





LEFT Test pilot Frank Dawson Paul (nearest camera) and Chrislea co-founder Richard Christoforides demonstrate the roomy cabin of the Airguard at Heston in September 1938. Presumably this may have been the closest the latter got to experiencing the aircraft in its element, as he suffered from a fear of flying. Note how in the construction of the cockpit the two top fuselage longerons were carried on and “broken” to drop several inches to enhance the view from the cockpit, a primary aim of the design.

BELOW Sporting its dapper undercarriage fairings, or “spats”, and its final dashing pale blue and white colour scheme, the sole Airguard awaits another flight from Heston. It appears that the aircraft was never evaluated by the Air Ministry for Civil Air Guard service, possibly owing to its foreign engine, but also perhaps because of the perception that its neutral stability may have limited its value as a military trainer.

windscreen positioned high above the wing’s leading edge, providing an excellent field of view for the occupants. Not so practical were the wheel fairings; while they look attractive, when operating from grass airfields “spatted” wheels are apt to get clogged up. Miles Magisters had the same problem and frequently flew minus the fairings. Also, the Airguard’s narrow-track undercarriage would have proved problematic for students.

Other features included controls operated by pushrod, lever and cable with no pulleys incorporated. Production models would have folding wings, a universal joint fitted to the rear spar roots enabling the wings to be pulled back and turned vertically before being swung against the fuselage. Manually-operated three-position flaps were fitted and extended out to the ailerons. The roomy cockpit was fitted with dual rudder pedals and a central control column. The emphasis was on cheapness of production, it

having been estimated that the Airguard would have sold for around £550.

The sole example, given construction number LC.1 and registered G-AFIN, was built at Heston in July 1938. First flight tests in the autumn of that year were not promising. Frank Dawson Paul was entrusted with the task in the unpainted and unspatted aircraft and a fault with the fuel-feed system led to a forced landing, resulting in damage to the undercarriage. After repairs, testing continued throughout September and there were plans to put the aircraft into production at the S.E. Opperman works on the North Circular Road, deliveries to commence the following year. But it all went rather quiet.

One of the CAG stipulations was that contenders should have a British engine, making the Airguard, with its Czech-designed Walter Mikron, ineligible. There is a view that had the Airguard used a Blackburn Cirrus or D.H. Gipsy motor its fortunes may have been different — but





then the cost would have increased accordingly.

With pleasing lines, the Airguard looked right, but it is questionable that it would have made a good training aircraft. It has been suggested that its large wingspan, small tailplane and elevators, coupled with its neutral stability, would have made the Airguard unsuitable for aerobatics and spinning. Sadly, plans to produce the Airguard in large numbers for the CAG came to nothing.

In 1940 G-AFIN was owned by James W. Haggas of Throssington, Leicestershire, and was thought to have been broken up in 1946. But in 1970 Bill Goldfinch of Salisbury offered the remains of the aircraft, minus fuselage, engine and undercarriage, to the Northern Aircraft Preservation Society, later The Aeroplane Collection Ltd. A set of drawings existed and the plan was to restore the Airguard to at least static condition. A replica fuselage was built and for a while the aircraft could be seen at The Craft Centre at Warmingham Mill, Cheshire.

THE IDEAL LIGHT AIRCRAFT

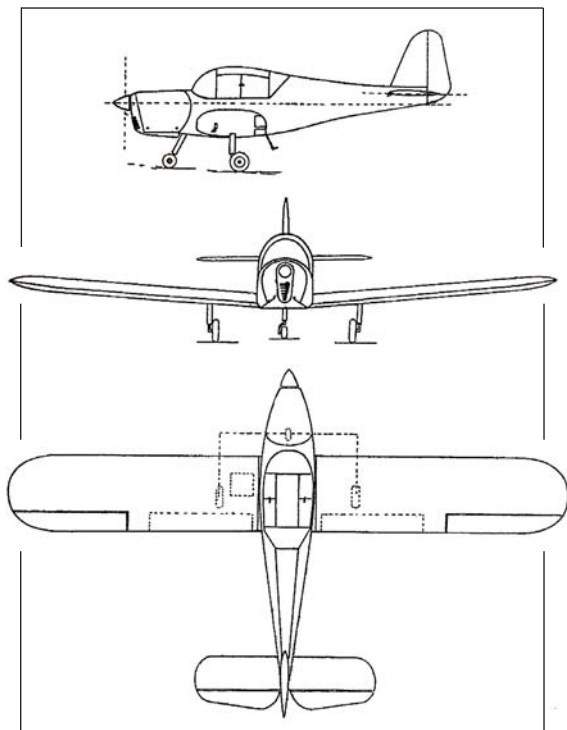
The January 1947 issue of *The Light Plane*, a short-lived post-war monthly aviation magazine aimed at owners and pilots of private aircraft, contained a questionnaire asking readers what kind of light aircraft they wanted. From the many replies the editorial team was able to put together a composite picture of what that should be.

In a nutshell, readers of *The Light Plane* said their ideal had to incorporate the following: four-seats; tricycle undercarriage; of mixed wooden and metal construction; have conventional controls operated by wheel or stick and with rudder bar. A nose-mounted single inline engine of 125–130 h.p. driving a variable-pitch propeller was preferred.

Ideal performance should be a cruising speed of 115–125 m.p.h. (185–200km/h) and sufficient fuel to give a range of 500 miles (800km). The most desirable features listed were all-round visibility, low landing speed and ease of handling. A self-

ABOVE *The Airguard makes a low pass sans spats, which were found to clog up with mud and debris and were often removed. The undercarriage was of a simple half-fork type and employed eight rubber buffers under compression. The rebound was taken on one buffer with a split fibre bush bearing on a conical shoulder to serve as a check. Reportedly, the undercarriage legs could be replaced in less than 30min.*

BELOW *A three-view of the Bianchi Survey, designed by British aviation pioneer Doug Bianchi in response to a questionnaire published by aviation publication The Light Plane in 1947. The four-seat touring design looks remarkably modern by contemporary standards, and similar in configuration to the Beagle Pup, which made its first flight two decades later.*





ABOVE The sole CH.3 Series 1 Ace, G-AHLG, in its original configuration with a single fin and rudder. The large cabin, around which the aircraft had largely been designed, created turbulent airflow which tended to blanket the tail surfaces at low speeds. Test pilot Rex Stedman had considerable difficulty making turns during early flights.

starter, flaps, radio and blind-flying equipment were also considered advantageous. An aircraft possessing all these features should cost around £1,000. *The Light Plane* posed the question: "Well, manufacturers, can you oblige?"

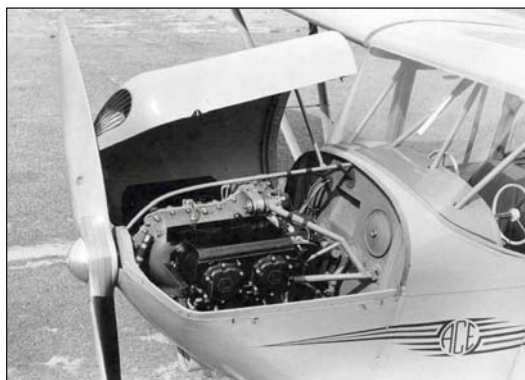
When civil flying recommenced in Britain on January 1, 1946, some companies were already off the mark with products either on the market or under development that incorporated many of the features specified in the survey. Among them were the Auster Autocrat, Miles Messenger and Percival Proctor, to name just a few — but all were taildraggers.

One of several responses to the challenge from two-man bands came from the late great Doug Bianchi. The July 1947 issue of *The Light Plane* featured a two-page spread on his concept for the ideal four-seat touring aeroplane, aptly named the Survey. It was low-wing, had four-seats, a 38ft (11.5m) span and was powered by a 150 h.p. engine. It also included the majority of the wishes arising from the survey, including a

tricycle undercarriage. But price was likely to be the problem. Owing to heavy labour costs and the more powerful engine required it was doubtful that Bianchi's Survey would have sold at less than £1,500.

A SHOT IN THE ARM — AND THE FOOT

Another promising contender was in the process of being built at the time of *The Light Plane* survey. Richard Christoforides had registered a new company, Chrislea Aircraft Company Ltd (dispensing with the word 'The'), although curiously the name was changed to Beam Aircraft Company Ltd, on May 10, 1947. Throughout the war the original company was engaged in manufacturing components for military aircraft, but soon after work was in progress on a four-seat light aircraft aimed at the aforementioned market. Designer Bernard Leak had left the company in December 1939 to become chief designer at Folland Aircraft, his place taken by former Miles Aircraft engineer Ralph F. Marshall.

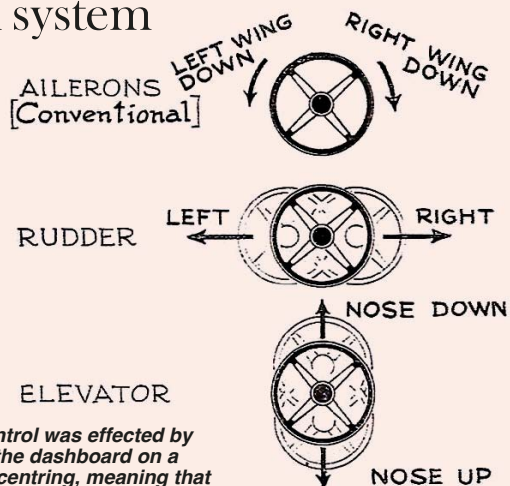


ABOVE A series of publicity photographs of the Ace, showing its novel features, including (left) the simple cabin, unusual "steering-wheel" flying controls and door designed for easy access, and (right) the car-type upper cowling, hinged around a line on the starboard side. The lower cowling could be quickly detached as a complete unit.

chrislea's unusual control system



In the flight control system devised by Chrislea, all control was effected by a single wheel mounted on a column protruding from the dashboard on a universal joint. Unfortunately the system was not self-centring, meaning that it was extremely difficult to find a level/straight control position to work from.



The first design from the reformed company was the Chrislea C.H.3 Series 1 Ace, a pretty, dual-control, high-wing cabin four-seater designed around the new and untried 100 h.p. flat-four engine made by the Monaco Motor & Engineering Company Ltd of Watford. This promising engine never reached production and the company, which had test facilities at nearby Elstree aerodrome, fizzled out. Instead, a 130 h.p. Lycoming 0-290-3 flat-four was selected for the Ace. At first glance the Ace bore an uncanny resemblance to the pre-war two-seat Peterborough Guardian. Intended as a contender for the CAG market, the Guardian was equipped with a tricycle undercarriage and powered by a 90 h.p. Blackburn Cirrus. Allotted the registration G-AFZT, it was nearing completion when war put a halt to the project.

The Series 1 Ace had a fabric-covered welded-steel tube fuselage with wings and tail surfaces of wood, although production models would have used metal throughout. It was a well-thought-out design with a roomy cabin and good all-round visibility, even to the rear. Access to the simple mounting of the Lycoming engine was engineer-friendly via car-type hinged cowlings. The short nose afforded a good view forward. Vee struts supporting the semi-cantilever wings attached in front of the large cabin doors and the tricycle undercarriage, a novel feature for light aircraft of the time, gave a cabin floor parallel with, and just less than 2ft (60cm) from, the ground, thus allowing easy access, unlike that of the comparable Auster. The cabin had plenty of headroom and two passengers were accommodated in a car-type bench seat positioned far enough behind the two front bucket-type seats to avoid being cramped. The instrument panel was described as tidy and well appointed, but the fly in the ointment was the Chrislea-designed flying-control system.

This was intended to reduce the technique



ABOVE Within three weeks of its first flight the Ace had been fitted with twin fins and rudders and the dihedral of the wings had been reduced. The aircraft was ultimately withdrawn from use in January 1949 and scrapped at Exeter in the spring of 1952.

of flying to little more than that familiar to the motorist. "If you can drive a car, you can fly an aeroplane" was an overstated claim by many aircraft manufacturers, although the pre-war Erco Ercoupe came closer to this ideal than others. The Ercoupe's ailerons and rudders were interconnected, there being no direct pilot control of the rudders. By limiting up-elevator the Ercoupe was also unspinnable. To these ends the rudder bar was eliminated on the Ace and



ABOVE The prototype CH.3 Series 2 Super Ace, G-AKFD, initially retained the Chrislea control system but was ultimately fitted with a standard rudder bar, as were the majority of production Super Aces. The prototype was crated for Australia in March 1949 as VH-BRP, but was destroyed in a ship fire at Port Said a few weeks later.

ailerons and rudders were operated by steering-wheels mounted on columns protruding from the dashboard. There was even a foot-operated throttle in addition to a central hand throttle. Universal joints enabled the control wheels to rotate around all axes. The ailerons were operated by rotating the wheel left and right. So far, so orthodox, but for elevator control the wheel had to be moved up and down; there was no push-pull action on the wheel. Most complicated of all, and a completely unnatural action, was control of the rudder, achieved by moving the wheel sideways.

The CH.3 was designed to fulfil several functions. The front passenger seat was removable and the cabin sufficiently large for the Ace to be converted into a small freighter/“light van”, the makers claiming that a quarter-ton payload could be carried.

Registered G-AHLG, the sole CH.3 Series 1 Ace first flew from Heston on August 19, 1946, in the hands of chief pilot Rex F. Stedman (INSET), a skilled former wartime Blackburn test pilot who, in 1933, had designed and built a two-seater glider named *City of Leeds*, but whose name will forever be associated with miniature train making and the Leeds Model Company. It soon became evident that, fitted with a single fin and rudder, the Ace was seriously lacking in directional stability and when it appeared at the “businessman’s Radlett”, staged by the West London Aero Club at White Waltham on

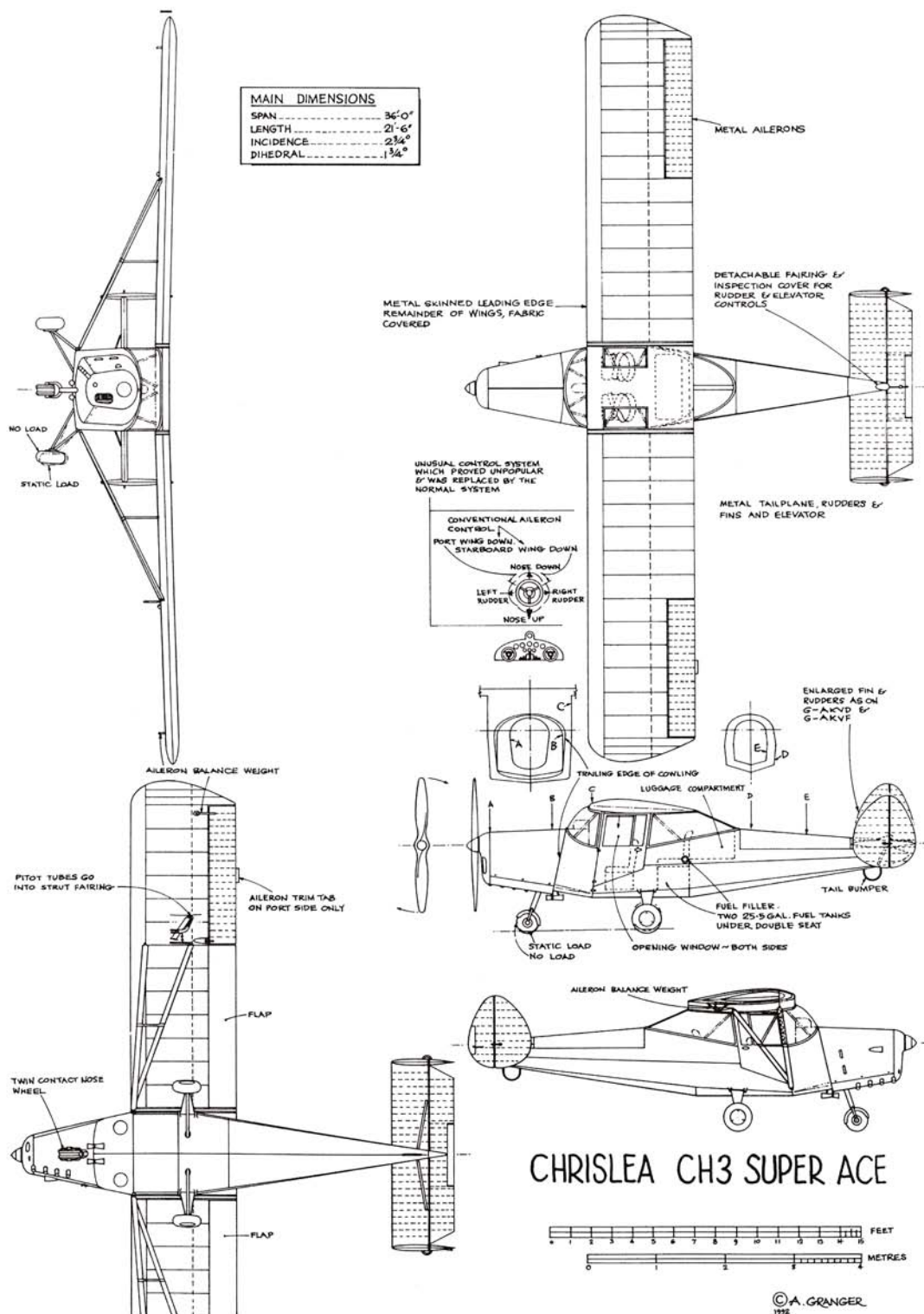


September 28, 1946, it had a twin-fin arrangement and the dihedral of the wings had been reduced.

Attendees at the show were unable to inspect the aircraft close up; it was still in the experimental stage and did not land. Nevertheless, for those interested in light aircraft, the Ace’s appearance was the outstanding event of the day. It made its public debut at the same venue on January 17 the following year and, although there was great interest, a sleek, all-metal American Globe Swift stole the attention of those looking for something new. The original price tag for the CH.3 Series 1 Ace was in the region of £950, but following modification and further development £1,500 would have been a more realistic figure.

THE SERIES 2 SUPER ACE

With news that Heston was to close, Chrislea moved west, to larger premises at Exeter Airport in Devon. Although things had gone very quiet with the Ace, the appearance of the CH.3 Series 2 Super Ace caused a revival of interest. First flown by Rex Stedman from Exeter on February 15, 1948, this much-modified version was more angular and, owing to the non-availability of the Monaco engine, incorporated the tried and trusted — and more expensive — 145 h.p. de Havilland Gipsy Major 10. According to a report in *The Light Plane*, during the first flight tests Stedman, well satisfied with the Super Ace’s flying characteristics, made a flypast at 80 m.p.h. (130km/h) sitting in the





ABOVE The Series 2 Super Ace production line at Exeter in April 1948. By the summer of that year, all was not well at Chrislea and the factory was closed for two months owing to "material shortages", a result of financial difficulties with the company's suppliers.



LEFT Donald Lowry, who took over from Rex Stedman as Chrislea's test pilot in 1949, also assumed the role of sales and publicity manager for the company.

BELOW The first batch of nine Super Aces lined up at Exeter in the summer of 1948. Chrislea announced that "as soon as the material supply position improves, it is hoped to put the next batch in hand" and that "over-seas interest in the machine has been encouraging".

MIKE HOOKS COLLECTION



back seat, arms folded, grinning down at the rather shaken chief inspector.

Of all-metal fabric-covered construction, the Super Ace had smaller rounded twin-fins, but despite initial adverse criticism retained the Chrislea "natural control" system. It also featured a novel foot-throttle pedal that overrode the hand throttle to the extent of increasing from any position set on the throttle up to full throttle, if full throttle had not already been selected. The well-appointed cockpit, with neat instrument grouping, also featured a full-width car-like shelf below the panel. The Super Ace was praised for the high-quality finish of its silver and blue paintwork. With two up it was also fully aerobatic.

Rex Stedman took the prototype around the country, visiting flying clubs and other likely customers. For would-be purchasers of the Super Ace, Chrislea was even prepared to throw in tuition up to "A" licence standard or give a conversion course to existing "A" licence holders. It soon became apparent, however, that the Super Ace's control system was unpopular, particularly with experienced pilots who found the side-ways and up-and-down movements of the wheel contrary to natural instinct, particularly in an emergency where the natural reaction was to pull the wheel to climb rather than push the wheel downwards. In some quarters the aircraft acquired the sobriquet "Grizzly" Ace.

Even so, orders came in, mainly from abroad and two production Super Aces were present at the SBAC Show at Farnborough in September 1948, both fitted with orthodox rudder pedals, but still with the up-and-down movement of the wheel to operate the elevators. At first it appeared

that Chrislea was on to a winner, stories in the press of large orders, particularly from abroad, stoking up that impression. But the increased cost of operating the more powerful Super Ace and disenchantment with the flight-control system produced disappointing home sales.

By mid-1949 sales manager and test pilot Donald Lowry, a replacement for Rex Stedman, who had resigned from the company in August, was assuring the aviation press that the company was not closing down, just curtailing production owing partly to the supply position and to internal economy measures. In January 1949 Lowry took the Super Ace to Hatfield, where it was flown by John Derry, taking time out from high-speed flight. Production therefore continued at a slower pace to satisfy orders coming mostly from Commonwealth nations and South America. Of the 13 Super Aces registered originally in the UK, more than half were delivered abroad.

JACK-OF-ALL-TRADES

During August 1949 Chrislea conceded to the inevitable return to the traditional when late-production airframe G-AKVS was fitted with conventional joystick and rudder controls and a tailwheel configuration. The two-seat C.H.3 Series 4 Skyjeep was powered by a 155 h.p. Blackburn Cirrus Major 3. A larger cabin provided more legroom and, in an effort to appeal to a wider market, the Series 4 could be converted to a single-seat freight-carrier in 7min. Cleverly, the rear fuselage decking was hinged at the forward edge and could be lifted almost vertically like a car boot so that aft of the cockpit there was room for either 75ft³ (2.1m³) of freight — including



long or awkward items up to 14ft (4.25m) in length — or a stretcher, the air ambulance conversion reportedly taking 13min. Presumably the conversion to tailwheel configuration was to allow for the additional weight of freight/stretcher aft of the centre of gravity.

The 2hr first flight of the prototype was made by Donald Lowry from Exeter on November 21, 1949, the aircraft making its public debut at the Royal Aeronautical Society's garden party at White Waltham on May 14, 1950. A few weeks later it won the Goodyear Trophy at the 1950 King's Cup air race meeting, held at Wolverhampton on June 17, lapping the course at a respectable 119.5 m.p.h. (190km/h).

Chrislea's post-war designs were well thought out with great appeal, but there is little doubt that the company's insistence on retaining the original novel flight control system was its Achilles' Heel. Had the Ace been equipped with conventional controls from the outset there is every likelihood that it would have been a winner. The main interest for the Ace came from abroad, although currency problems forced the cancellation of many orders. Back in July 1948 *The Aeroplane Spotter* was moved to say: "To attempt any forecast in these days of uncertainty is dangerous, but we confidently predict that the Super Ace will become a common sight in English and foreign airfields in years to come".

Although three Super Aces were completed as Skyjeeps for sale abroad, Chrislea was experiencing serious financial problems by 1950 and in October that year the company was acquired by the C.E. Harper Aircraft Co Ltd. A total of 18 Super Aces and three Skyjeeps had flown. Two Skyjeeps

and seven Super Aces were never completed and were scrapped by the new owner, which later changed its name to Harper Engineering & Electronic and became a subcontractor to Vickers, making parts for the Varsity, Viscount, Valiant and VC10.

POSTSCRIPT

Today, two airworthy Super Aces and a CH.3 Skyjeep survive. Super Ace 2 G-AKVF (c/n 114) was built at Exeter in 1950 and exported to Pakistan, where it flew with the Lahore School of Flying as AP-ADT. It was restored to the British register in November 1959 and passed through several ownerships until it crashed at Shoreham in May 1972. The engineless wreck was bought by Paul Longthorp who restored it to *concours* condition and made the first post-rebuild airtest on November 8, 1981. It is currently owned and flown by B. Metters. Super Ace 2 G-AKUW, owned by J. and S. Rickett, has always remained in the UK. Skyjeep G-AKVR was exported to Australia as the second iteration of VH-BRP in 1951 and was unusually fitted with a 200 h.p. Gipsy Six. It later became VH-RCD before returning to the UK, where it is owned by R.B. Webber.

Richard Christoforides turned his back on aviation and under the name Jarc Motors Ltd developed the Little Horse, a hideous light-utility commercial vehicle with a vertically rear-mounted 250 c.c. Excelsior Talisman engine and four-wheel independent suspension, which claimed to do 65 miles per gallon (23km/lit). The vehicle did not sell and was acquired eventually by British Anzani after Jarc Motors was wound up in 1957.



The prototype CH.3 Series 4 Skyjeep G-AKVS with its original smaller fins in 1949. The hinged rear decking opened up to reveal a compartment fitted with special rails and support-carrying rollers, into which a stretcher could be fitted. A medical attendant would have sat with the pilot in the front cabin.





MIKE HOOKS COLLECTION

ABOVE *The Skyjeep was fitted with standard flight controls, but the rubber-covered footprint rudder pedals were still unusual, being placed at a slight angle to the floor and operated harmonium-style. Flight Editor Maurice Smith described using the pedals as "taking a little getting used to, unless one frequently dances on one's points . . ."*

chrislea airguard, ace, super ace and skyjeep data

Powerplant

LC.1 Airguard 1 x 62 h.p. Walter Mikron Mk II **CH.3 Srs 1 Ace** 1 x 130 h.p. Lycoming O-290 **CH.3 Srs 2 Super Ace** 1 x 145 h.p. de Havilland Gipsy Major 10 **CH.3 Srs 4 Skyjeep** 1 x 155 h.p. Blackburn Cirrus Major

	LC.1 Airguard	CH.3 Srs 1 Ace	CH.3 Srs 2 Super Ace	CH.3 Srs 4 Skyjeep
Dimensions				
Span	35ft 9in (10.9m)	34ft 0in (10.4m)	36ft 0in (11m)	36ft 0in (11m)
Length	21ft 5in (6.5m)	21ft 0in (6.4m)	21ft 6in (6.6m)	22ft 2in (6.8m)
Height	6ft 3in (1.9m)	7ft 9in (2.3m)	7ft 7½in (2.3m)	7ft 0in (2.1m)
Wing area	157ft² (14.6m²)	167ft² (15.5m²)	177ft² (16.4m²)	177ft² (16.4m²)
Weights				
Empty	810lb (367kg)	1,040lb (472kg)	1,350lb (612kg)	1,623lb (736kg)
All-up weight	1,300lb (590kg)	1,950lb (885kg)	2,400lb (1,090kg)	2,550lb (1,157kg)
Performance				
Maximum speed	118 m.p.h. (189km/h)	127 m.p.h. (204km/h)	126 m.p.h. (203km/h)	130 m.p.h. (209km/h)
Cruise speed	104 m.p.h. (167km/h)	116 m.p.h. (187km/h)	115 m.p.h. (185km/h)	115 m.p.h. (185km/h)
Stall speed	37 m.p.h. (60km/h)	45 m.p.h. (72km/h)	43 m.p.h. (69km/h)	48 m.p.h. (77km/h)
Initial rate of climb	550ft/min (167m/min)	720ft/min (219m/min)	750ft/min (229m/min)	550ft/min (167m/min)
Normal range	375 miles (604km)	290 miles (467km)	400 miles (645km)	520 miles (837km)
with aux. tank	—	—	560 miles (900km)	800 miles (1,287km)

Next stop Japan — Republic F-84E Thunderjets of the 27th Fighter Escort Wing (FEW) aboard the USS Bataan at San Diego, California, in late November 1950, before their sea journey to Yokosuka in support of operations in Korea.

WILBUR SEGERSON VIA AUTHOR





DISTANT THUNDER



THE 27TH FIGHTER ESCORT WING IN KOREA

When North Korean forces rolled into South Korea in June 1950, it was imperative that Strategic Air Command's bombers be able to ply their trade without interference from the latest Soviet-built fighters. Enter the F-84E Thunderjets of the 27th Fighter Escort Wing. **WARREN E. THOMPSON** details the unit's brief but action-packed Korean adventure

AS THE COLD War began to heat up between the USA and Soviet Russia, it was apparent that the former's Boeing B-29 and B-50 bombers would need plenty of protection should a major war start between the two. As the jet age was beginning to gain momentum, the Soviet Union's main focus was on defensive fighters in large numbers. Initially, the USAF's Strategic Air Command (SAC) fielded the piston-engined North American F-51D Mustang as its principal escort fighter, before introducing a development of the type, the F-82E Twin Mustang. By 1950 SAC had switched to jet power — albeit straight-winged — with Republic's F-84E Thunderjet.

TOP An F-84E of the 522nd Fighter Escort Squadron (FES) up over the Sea of Japan on a test flight after routine maintenance. **ABOVE** The badge of the 27th FEW (now 27th Special Operations Wing) incorporates a clenched fist and a magnolia, the state flower of Louisiana, where the original 27th BG was formed.

When the forces of North Korea crossed the 38th Parallel on June 25, 1950, the curtain was raised on the jet warfare era. Although the Soviet MiG-15 didn't make an appearance in Korea until early November 1950, the USA already had front-line jets in the form of the USAF's Lockheed F-80s and the US Navy's carrier-based Grumman F9F Panthers.

Several B-29 bomb groups were brought in to



ABOVE The 27th FEW was initially drafted into action in Korea to protect Boeing B-29s from the defending North Korean fighters. This example, 44-87734 Double Whammy, was operated by the 19th Bomb Group, the first B-29 unit to see combat in Korea, and was lost as the result of a runaway prop shearing the fuselage in January 1952.

destroy North Korea's ability to wage war, which they accomplished in a remarkably short time. It looked like the war would be over by Christmas, but in early November, the Chinese unleashed hundreds of thousands of troops against the United Nations (UN) forces in Korea.

As a result the USAF despatched the North American F-86A Sabres of the 4th Fighter Wing to counter the growing MiG threat. There were not enough F-86s in theatre to escort the bomber force fully, however, so SAC was ordered to send in the crack 27th Fighter Escort Wing (FEW), not only to fly escort missions in support of the bombers, but also to deliver bombs on targets along the Yalu River on the Korea/China border. The 27th FEW comprised the 522nd, 523rd and 524th Fighter Escort Squadrons (FES), and would be the first of many F-84 units to see combat during the three-year conflict.

The USS *Bataan* (CVL-29), an *Independence*-class light aircraft carrier, rushed all three squadrons to Japan, arriving on November 30, 1950. The forward echelon would settle in at Taegu Air Base (K-2) on December 5 and fly its first mission two days later. The rear echelon would set up shop at Itazuke Air Base on Fukuoka in Japan.

INTO COMBAT

Although photo-reconnaissance images showed that there were large numbers of MiG-15s based at Antung and Mukden in Manchuria, very few were venturing south of the river, so the 27th FEW's Thunderjets were initially tasked with bombing missions. Records show that the Wing logged 927 effective sorties in its first 38 days of operations. By this time, the North Korean People's Air Force had been completely put out of business and the rapid destruction of targets



GEORGE BUSHNER VIA AUTHOR

In early 1951 the 27th FEW's strategy was to send two squadrons of bomb-laden F-84s to attack the target, with the third squadron providing top cover. To get to the bombers the MiGs would have to fight through the defending squadron. This 522nd FES F-84E, fitted with long-range fuel tanks, is seen at a base in South Korea in early 1951.



ABOVE The view from the office — a group of 27th FEW Thunderjets patrol deep into North Korea while protecting a low-level strike force of North American F-51 Mustangs. The long-range fuel tanks attached to the inner wings were rather inelegant, but provided vital loiter time for extended missions in support of the “mud-movers” below.

up in “MiG Alley”, the north-western part of North Korea, could no longer be ignored by the Communists. The time had come for a face-off between the MiG-15 and the F-84E.

Things did not initially go well for the Soviet-supplied MiGs, probably because the North Koreans had little information on the F-84 and how deadly it was at lower altitudes. In addition, most of the 27th FEW’s pilots had flown as fighter pilots during the Second World War, so their experience level was high.

During January 21–29, 1951, four MiG-15s were shot down by the 27th’s F-84Es. The first confrontation between the two occurred on January 21, when Lt-Col William E. Bertram was leading a flight up near the Yalu. His wingman, Lt Donald D. Watt, recalls the sortie:

“Our mission was to take down a rail bridge in the vicinity of Pyongyang. En route we heard the

radio chatter from one of our sister squadrons stating they had just encountered a bunch of MiGs and for us to keep our eyes wide open. Just as we were beginning our bomb-runs, the radio began heating up with MiG calls, and in a few seconds we were literally covered up. One of our pilots that got hit stated that they were so close, he could hear their cannon when they fired.

“As I broke off my second bomb-run, I saw Bertram climbing up into the sun, so I followed him, and out of the corner of my eye, I saw one of our jets on fire. It was about that time that Bertram pounced on one of the MiGs and shot him down in flames, which ended up being the first MiG-15 shot down by an F-84 in the Korean conflict. The sky all around us seemed to be full of swept-wing fighters.

“I focused on a MiG that was in a gentle turn to port; I turned into him at full throttle, cutting

A 522nd FES pilot poses beside his F-84E in the early summer of 1951. Each of the 27th’s units had a signature colour; the 522nd’s was red, the 523rd’s was yellow and the 524th’s was blue.





ABOVE Lieutenant Jacob Kratt Jr of the 523rd FES was awarded the Silver Star in June 1951 for his actions on January 23, 1950, during which he shot down two MiG-15s while providing top cover for low-level attacks on Sinuiju by the 522nd and 524th FESs. His Silver Star citation praises his “aggressiveness, determination and unswerving devotion to duty”.

REPUBLIC F-84E DATA

Powerplant 1 x 5,000lb-static thrust Allison J35A-17 turbojet engine with 11-stage axial-flow compressor and single-stage turbine

Dimensions

Span	36ft 5in	(11·09m)
Length	38ft 7in	(11·76m)
Height	12ft 10in	(3·91m)
Wing area	260ft²	(24·15m²)

Weights

Empty	10,205lb	(4,629kg)
Combat weight	14,724lb	(6,679kg)

Performance

Maximum speed		
at sea level	613 m.p.h.	(987km/h)
Cruise speed	481 m.p.h.	(774km/h)
Landing speed	142 m.p.h.	(229km/h)
Climb	6,060ft/min	(1,847m/min)
Service ceiling	43,220ft	(13,170m)
Normal range	1,485 miles	(2,390km)

“WE BEGAN A DIVE TOWARDS THE MIG FORMATION FROM 14,000FT

inside of his turn and started firing, even though he was still well out of range. I was so intent on the kill that I failed to notice another MiG on my tail firing away in my direction. I was not aware of it at the time, but Lt [Jacob] Kratt was on that MiG’s tail and couldn’t fire because he had both of us in his sights. I broke hard left and hauled back on the stick; I suddenly felt a violent jar and found myself staring at the instrument panel with cold air rushing all around me. My plastic goggles were gone, but my helmet and oxygen mask were still in place. I dropped the nose and, at full throttle, headed down for the deck.

“As the howling of the wind increased, I looked down to check my airspeed and I was near the red line. I realised my canopy was missing. Dropping back on power, I stayed below the Mach level and hugged the ground so a MiG couldn’t make a firing pass on me.”

As Watt returned to Taegu, he reported his position every 5min to the others in his strike

force, some of whom later remarked that, when they heard him, he sounded so cold they turned up the heat in their own cockpits! Watt approached friendly territory at 27,000ft (8,200m), with the temperature at -45°C.

Some 60 miles (100km) from the base, Watt was joined by another F-84 that helped him make a minor heading change and they landed without incident. It had been a tough day for the 27th; one of the pilots was hit and had to bale out. Official reports state that the pilot became a PoW but later died in captivity. Another F-84 was also badly mauled, the pilot limping back to Taegu trailing smoke all the way. Two days later the 27th FEW would exact revenge on the MiGs.

BACK ON TOP

The 27th’s top scorer during this period was 1st Lt Jacob Kratt, with two kills on January 23rd. He later reflected on the events of the day:

“Our assigned target was the enemy airfield at

The opposition — the Mikoyan-Gurevich MiG-15 was a quantum leap from the World War Two-vintage prop-driven aircraft initially fielded by the North Koreans. This example, “Blue 823” (c/n 108023) of the 176th GIAP based at Antung, was damaged during a B-29 raid on bridges over the Yalu on April 12, 1951, in which F-84Es were used for close support.

ARTWORK BY JUANITA FRANZI © 2014



Thunderjet 51-1083 of the 524th FES returns from a combat mission over North Korea in the early spring of 1951. This aircraft was one of many left behind when the 27th FEW left Korea in July 1951. On January 7, 1953, while serving with the 58th Fighter Bomber Group (FBG), it was hit by anti-aircraft fire and damaged beyond repair during a forced landing at K-14 Kimp'o.



WITH AIRBRAKES EXTENDED AND RED-LINE INDICATED AIRSPEED”

Sinuiju, which was just south of the Yalu and about 15 miles [24km] from the MiG base at Antung. Our mission leader was Col D.J.M. “Don” Blakeslee [a World War Two veteran with 12½ aerial victories to his credit]. Our strategy was to equip two squadrons with bombs, rockets and 0.5in-calibre ammunition, so they could take out any aircraft, hangars or bunkers they might encounter on that airfield. My squadron [the 523rd FES] was to fly top cover to protect the bombers in case any MiGs decided to interfere.

“As I scanned the sky for any sign of MiGs, I noticed the sun was positioned at our five o’clock position and about 40° above the horizon. Just as our two squadrons started their runs on the target, I saw dust plumes billowing from the airfield at Antung, which indicated that a bunch of MiGs were taking off. A minute later I saw a brilliant flash of light, the reflection of the sun off an object that was followed by several more flashes. The MiGs were already over the

Yalu at about 3,000ft [915m], making a dash to the east and straight for the airfield at Sinuiju.

“I radioed lead and told him. Time was critical; our guys below were on their bomb-runs and would easily be blindsided by the attacking MiGs. My element immediately began a dive towards the MiG formation from 14,000ft [4,270m] with speed brakes extended and red-line indicated airspeed. We were coming at them out of the sun and for a split second I thought about trying to distract them, but that wouldn’t work.”

Closing the gap quickly, the F-84s pulled in directly behind the MiGs at a distance of about 2,000ft [600m]. Kratt retracted his airbrakes and aligned himself perfectly with the tailpipe of the leading MiG. He pulled the trigger for two long bursts, with strikes on the MiG’s tailpipe. Within seconds smoke started billowing from the Soviet fighter and the crippled MiG began a turn to port over the river and straight into the ground.

Humid conditions during the Korean summer made it difficult for the Thunderjets to leave the ground with a heavy load. Here a pair of 522nd F-84s get off at K-2 Taegu with the help of jet-assisted take-off (JATO) rocket bottles in 1951. JACOB KRATT VIA AUTHOR





LEFT As the conflict progressed, the quality of North Korea's defensive firepower increased dramatically, with sophisticated Chinese anti-aircraft artillery being drafted in. This 524th FES Thunderjet managed to make it back to Taegu with a sizeable part of the fin and rudder missing.

BELOW An F-84E of the 522nd FES departs Itazuke AB in Japan loaded with 1,000lb general-purpose bombs. It would complete its bombing mission over North Korea, land and refuel at a base in South Korea, complete a second mission and head back to Itazuke.

The MiG's wingman had stayed in close with the stricken fighter and Kratt took the opportunity to get a few rounds off at him too.

"At this point our overtake speed was such that we were well within 1,000ft [300m] of the rest of the MiG formation, so I decided to pull up to starboard and see what additional opportunities might crop up. As we executed our pull-up, my wingman and I were suddenly put on the defensive as four MiG-15s, flying in elements of two, were firing their cannon at a great rate in our direction. We continued our climb and increased our turn-radius to a point at which they lost the advantage and disengaged.

"A short time later, I spotted another flight directly beneath us at much lower altitude. I began a spiral dive until I was in a good position to begin a healthy pull-out and was once again

beautifully aligned at a range of about 2,000ft, at which point I fired several long bursts. This played out exactly like the first kill moments before; plenty of smoke ending in an exploding crash. Our cover unit had done its job as our two bomb-laden squadrons had hit their targets and done a lot of damage without having to worry about MiGs. All our jets returned to base safely."

Kratt's double kill had set a benchmark for other F-84 pilots that would be hard to beat.

THREE DOWN

On the same mission another 523rd FES pilot became entangled with an aggressive MiG that was determined to penetrate the top cover provided by the Thunderjets. Captain William W. Slaughter was a combat-experienced pilot in the 523rd and was credited with the squadron's





ABOVE Armourers work on servicing the 0.5in machine-guns of a 522nd FES Thunderjet at Taegu in February 1951. The F-84E could also carry 4,500lb (2,040kg) of bombs or 32 x 0.5in rocket projectiles.



LEFT The snug office of the F-84E. Although nicknamed the "Lead Sled" owing to its ground-gripping long take-off runs, the F-84E was nevertheless popular with its pilots, having the characteristic ruggedness of a Republic design.

BELOW The blue trim on this F-84E at Itazuke in early 1951 marks it out as belonging to the 524th FES. The markings were essentially the same for all 27th FEW F-84s, but in different colours.

VIA AUTHOR





CHARLES WILLIS VIA AUTHOR

ABOVE Thunderjet 49-2420 at a base in South Korea while operating with the 524th FES. This F-84E went on to serve with the 136th FBW in Korea, and was lost with its pilot, Capt Herbert Ritter, when it was shot down by a MiG-15 on October 1, 1951.



LEFT Tangling with MiG-15s proved dangerous at any altitude. This 522nd FES F-84 was on the receiving end of a MiG-15's 37mm cannon during a low-level chase, but managed to limp back to Taegu with a damaged tailpipe in May 1951. HAROLD SAABYE VIA AUTHOR

third MiG-15 kill of the day. He remembers the experience well.

"This mission was pretty messed up from the start. For some reason or another I was not scheduled to fly my assigned Thunderjet and instead had to take one that had been written up as firing 200ft [60m] low and to the far left. Our flight leaders on this mission had lots of combat experience from World War Two, and they knew how to extract the maximum from our F-84Es. I was one of the leaders on the day and our strategy was to arrive just ahead of the main bomber force and make a quick strafing pass on Sinuiju airfield to see if we could entice any of the MiGs to come across the Yalu from their base at Antung. We were itching for a fight with them.

"On my first strafing pass I tried to mark an 'X' on the windscreen with a grease pencil to show where my rounds hit, since I could not depend on the gunsight as being completely accurate. To make matters worse, some brain at the Pentagon decided we could not use tracer ammo because it was misleading, so we had no reference as to where our rounds were going. As we swooped down on the airfield, we could see numerous MiG-15s getting airborne from the runway at Antung. The first to take off were already mixing it up with the 523rd FES flight that was above us.

"As I glanced up I saw one of our '84s in a steep dive, trailing smoke, but I later found out that it was not smoke but fuel as he had taken a

cannon round in one of his tiptanks. We were anxious to get into the fight. Our leader, Capt Alan McGuire, turned into them and took a long shot, my wingman and I covering for him. That didn't last long because a pair of MiGs were barreling in on us from our four o'clock position. Those swept-wing fighters were so fast the only chance we had was to let them make a pass and then try to pick them up as they whizzed by."

STRENGTH AND INTELLIGENCE

The two MiGs that made the distant pass on Slaughter broke away some distance from the Thunderjets. This allowed Slaughter to get in a long-distance burst at the lead MiG. No hits were observed but some of the rounds must have hit or come close enough, as the MiG pilot popped his airbrakes out in an attempt to make the F-84s overshoot. Slaughter was able to slow down quickly, however, which enabled him to stay behind the attackers. His wingman told him to go ahead and close on the MiGs and he would protect his "six". Slaughter continues:

"I fired several short bursts from very close range while trying to guess where my rounds were hitting. As I moved in closer I fired again and this time there was no doubt where my rounds were going; they appeared to be raking the MiG's cockpit area and starboard wing root. At almost point-blank range I fired a long burst

and immediately the MiG started trailing smoke and dropped its nose into a shallow dive with no evasive action taken. Evidently, the pilot was either dead or severely wounded because I sat right on his tail so I could get a good picture when he crashed into the ground."

Both Slaughter and his wingman were so focused on the MiG that they didn't see another closing on them at high speed. Suddenly a string of big red "golf balls" whizzed over Slaughter's right shoulder and passed beneath the nose of his F-84. The only thing he could do was break hard to starboard in an effort to evade the MiG's cannon rounds and maybe reverse the situation.

While trying to get a visual on his new attacker, Slaughter missed seeing the first MiG hit the ground and explode. He realised that his wingman, Capt Edens, was not behind him and radioed him to make sure he was not in trouble. The reply was instant; Edens told him he was far above him and had several MiGs "cornered"!

Slaughter pointed the nose of his fighter straight up and pushed the throttle all the way forward. Edens had eluded the MiG gaggle and joined up on Slaughter's wing. They both checked their fuel gauges and realised they had better head south immediately or risk not being able to make Taegu. It had been a very successful day for the 27th.

As the number of F-86 Sabres in Korea increased, the need for F-84s to fly escort missions dwindled other than in support of other Thunderjet fighter-bombers. The F-84s concentrated on precision bombing and strafing with great success. Captain Slaughter recalls that, after that one mission on January 23, he had very few opportunities to lay eyes on a MiG.

One such opportunity involved a mission in which 27th FEW F-84s were tasked with escorting a group of B-29 Superfortresses on a mission over MiG Alley. The F-84s were late for the rendezvous and, when they did join up, the bombers were already under attack by MiGs. Slaughter fired a burst at one that was bottoming out of his firing pass but did not observe any hits. The MiGs quickly broke off and crossed back over the Yalu.

HOMEWARD BOUND

The 27th FEW received the Distinguished Unit Citation for its actions in the Korean conflict, the citation covering the period from January 26 to April 21, 1951.

The Wing returned to Bergstrom AFB in Texas on July 31, 1951, after which it was re-equipped with new F-84Gs. The unit had left its war-weary E-model Thunderjets in Korea to continue the fight with other units.



ABOVE Pilots of the 522nd FES pose beside F-84E serial 49-2404 Gypsy From Po'Keepsie, at Taegu in the spring of 1951. Kneeling third from right is Lt-Col John W. Lafko, the 522nd's Commanding Officer, who completed 134 combat missions over North Korea. The aircraft was lost on a strafing run in North Korea the following March.



PHILIP JARRETT COLLECTION

BEFORE & AFTER

ROGER TISDALE and ARVO VERCAMER detail the markings of the short-lived but historic Sopwith aircraft that won the Schneider Trophy a century ago

CONSTRUCTION OF A Sopwith “hydro tractor with 100 h.p. Gnome Monosoupape” commenced on February 2, 1914, and by March 31 a modified Tabloid with a larger rudder and triangular fin, a single wide main float and two small outboard floats had been completed.

The aircraft’s first attempt at flight almost ended in tragedy when pilot C. Howard Pixton was thrown out when the Hydro-Seaplane (HS) nosed over on to its back as the throttle was opened. The aircraft was recovered from the Hamble River and returned to Kingston for modification. Within a week it re-emerged with the main float, which had been mounted too far aft, divided longitudinally into two halves and without the outboard floats.

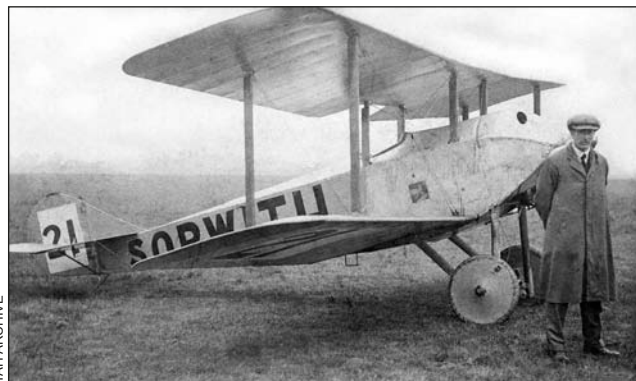
On April 8 the HS was taken to Richmond and briefly flown by Pixton. The following day it started its rail and sea journey to Monaco, where it arrived on the 16th, only four days before the Schneider Trophy contest was due to start.

Following testing of the HS the Lang propeller

was changed to a smaller Integrale example of coarser pitch and an additional fuel tank was added. A new raised rear float with a water rudder was also fitted. The race proved to be a triumph as the HS, with race number 3, surpassed all the other competitors, Pixton completing the 280km (175-mile) course in a little over 2hr.

Returned to Kingston, the aircraft was fitted with a wheeled undercarriage and was flown at Brooklands by Pixton on May 21 in preparation for the Aerial Derby on the 23rd, during which it was flown as No 21 by Harold Barnwell. On June 20 Harry Hawker flew the aircraft in the London–Manchester race as No 14, but did not complete the course owing to illness.

On June 27, 1914, Hawker took off from Brooklands but lost control at 1,200ft (360m) while making one of his trademark loops with the engine off. The aircraft was badly damaged as it crashed through trees but Hawker was uninjured. It was returned to Kingston, but the ultimate fate of this historic aircraft remains unknown.

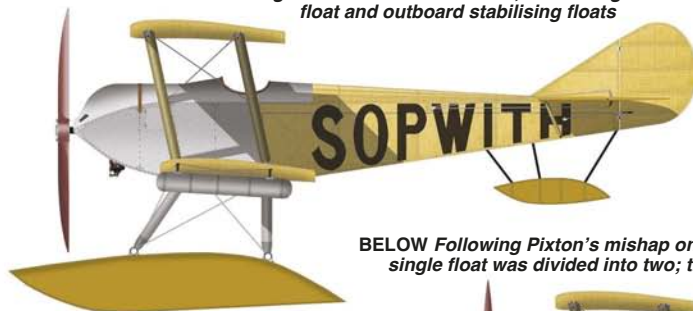


TAH ARCHIVE

TOP Surely one of the most evocative images of the glamour and romance of early aviation, the Sopwith Hydro-Seaplane bobs in the warm waters of the Mediterranean at Monaco in April 1914. The aircraft streaked into first place, despite its Monosoupape engine running on only eight of its nine cylinders for the last 13 laps of the race.

LEFT Harold Barnwell beside the Schneider Trophy winner after its conversion to landplane configuration. Barnwell flew the aircraft as “21” for the race at the Aerial Derby at Hendon on May 23, 1914. Unfortunately, mist and fog ensured that only four of the 11 starters completed the course, Barnwell being one of those who was forced to drop out.

BELOW The Sopwith Hydro-Seaplane in its initial configuration of late March 1914, with a single main float and outboard stabilising floats



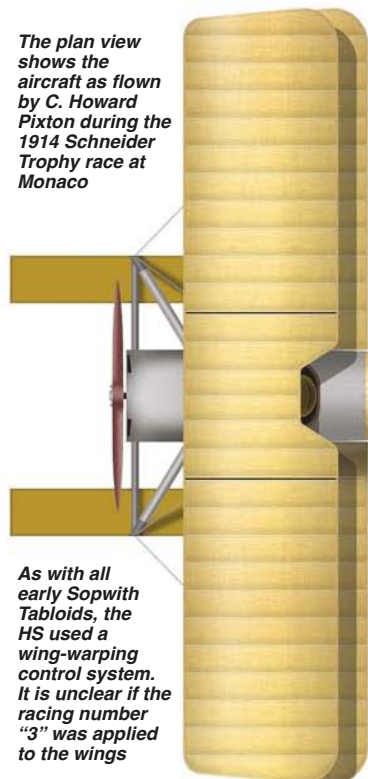
RIGHT Sopwith capitalised on the Schneider Trophy success by incorporating the HS into its company logo



BELOW Following Pixton's mishap on the Hamble River, the single float was divided into two; these were then moved further forward

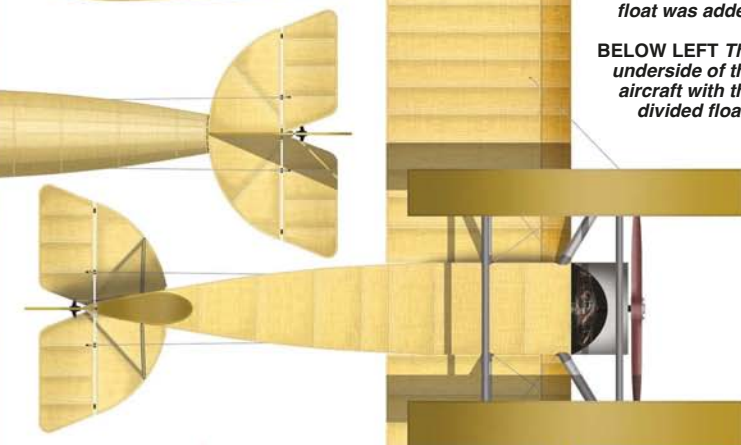


The plan view shows the aircraft as flown by C. Howard Pixton during the 1914 Schneider Trophy race at Monaco



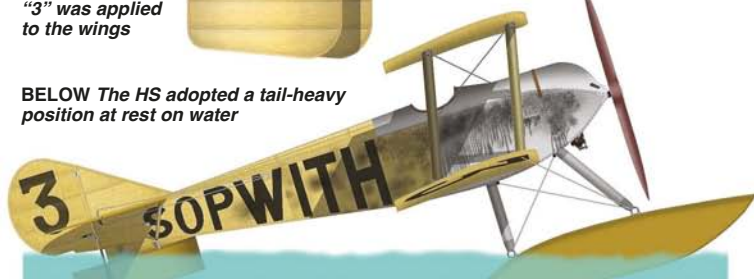
ABOVE Along with the new pair of divided floats, a revised raised rear float was added

BELOW LEFT The underside of the aircraft with the divided floats



As with all early Sopwith Tabloids, the HS used a wing-warping control system. It is unclear if the racing number "3" was applied to the wings

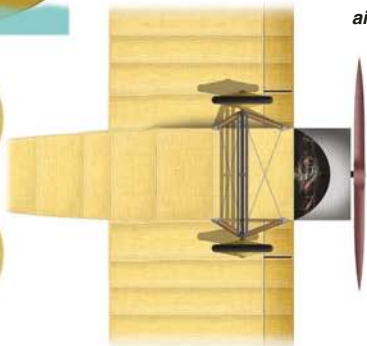
BELOW The HS adopted a tail-heavy position at rest on water



BELOW LEFT Scrap view of the V-strut wheeled undercarriage fitted to the aircraft on its return from Monaco



Following its fitting with wheels, the aircraft flew as "21" at the Aerial Derby on May 23, 1914, and as "14" in the London—Manchester race on June 20 the same year



NORTH AMERICAN P-51D MUSTANGS AWAIT OFFLOADING AT LIVERPOOL DOCKS, 1944





THE UGLY TRUTH?

DURING 1944–45 Liverpool's famous docks were the scene of some exciting arrivals from America in the form of fighters destined for service with the United States Army Air Forces (USAAF) against Nazi Germany.

PHILIP JARRETT presents an extremely rare collection of photographs of P-51 Mustangs, P-47 Thunderbolts, P-61 Black Widows and P-38 Lightnings in transit to their front-line units, with which they would soon be in action over Fortress Europe.

Intriguingly, the word "UGLY", is stencilled prominently on the protective covering of many of the fighters. Research has turned up nothing on what this project was or why it was given such an unprepossessing title — if *TAH* readers can shed any light on it, do let the Editor know; we'd love to get the full story!





ABOVE Republic P-47D Thunderbolt serial 44-33270 on a freighter at Liverpool docks before its onward journey to its ultimate destination, RAF Kingsnorth in Kent, where it served with the 53rd Fighter Squadron (FS), part of the 36th Fighter Group (FG), from April 1944. Note the word "UGLY" stencilled on the fuselage aft of the cockpit.



ABOVE A Lockheed P-38L is hoisted off the deck at Liverpool. Lockheed occupied one of the main hangars at Liverpool's Speke Airport (Douglas occupied another), the hangar being known as the company's British Reassembly Division. Aircraft would arrive from Garston Docks for reassembly, then be flown to their units.



Thunderbolt 42-75255 is lifted ashore from the deck of a Liberty Ship in 1944. It went on to serve with the 378th FS at Headcorn. Of the three other P-47Ds awaiting their turn, the one on the left is 42-76116, and on the right is 42-76404. Again, the word "UGLY" is stencilled above the serial on these two aircraft — what did it denote?



ABOVE An anonymous P-47 is lowered on to an RAF flatbed truck at Liverpool. The absence of cowlings panels on the top of the fuselage behind the engine was clearly deliberate, perhaps to permit regular en-route checks of systems or tankage. Most of the P-47s were stencilled with the words: "This plane processed with PAR-AL-KETONE", a corrosion inhibitor applied to protect the aircraft against salt water on its voyage.



LEFT The cockpit of P-38L Lightning 44-26085, photographed in mid-February 1945 by No 30 Maintenance Unit (MU) at Sealand in north-eastern Wales. The P-38L variant was fitted with a pair of turbo-supercharged 1,475 h.p. Allison V-1710 engines and, unusually for a fighter, was fitted with a control yoke instead of the more common control stick.



ABOVE North American P-51D Mustangs stowed below deck await their turn to emerge into the daylight. At the rear on the right is Inglewood, California-built P-51D 44-72381, again with the word "UGLY" prominently stencilled on the rear fuselage. This aircraft went on to serve with the 83rd FS of the 78th FG at Duxford, and saw post-war service with the Swiss Air Force as J-2129.

RIGHT Many of the photographs are marked on the back with the official stamp of No 30 MU at RAF Sealand, and it appears that they were intended for use as reference material to show the correct stowage procedures for the aircraft. This example shows a close-up of the lashing points for the undercarriage of a deck-stowed P-51D Mustang, with letters added to be cross-referenced against a key.





ABOVE Examination of this rather crowded deck scene reveals a Northrop P-61 Black Widow, two P-38 Lightnings and a pair of P-47D Thunderbolts on a superstructure of girders bolted and welded to the decks of the ship — probably a tanker — to allow the aircraft to be transported. What the white-encircled areas on the P-61B in the foreground refer to is unknown without the key which originally accompanied the pictures.

LEFT A close-up showing the anchorage for a P-61B Black Widow's tailbooms aboard ship. The stencilling identifies this aircraft as 42-39672, which went on to serve with the 422nd Night Fighter Squadron at Etain, France, in late 1944, with the name Little Audrey. The stencilling also includes the intriguing detail "PROJECT-92973-R" followed by "UGLY" — any clues as to what either of these may refer to would be gratefully received.



ABOVE This photograph of a P-38L (or possibly its photo-reconnaissance variant, the F-5E) aboard ship provides a good view of the extensive superstructure added to the vessel to carry the aircraft on their journey across the Atlantic to the UK, where front-line units eagerly awaited vital reinforcements to continue the war in Europe.



ABOVE An F-5E Lightning, minus its outer wing panels, awaits transport on a trailer to No 30 MU at Sealand in late July 1945. The fairing for the nose-mounted oblique camera is plainly evident, as are the auxiliary fuel tanks fitted beneath the wing centre section. If you have more info on "UGLY", do let us know!



CAPITAL GAINS



OSLO-FORNEBU AIRPORT 1934-40

Fokker F.XII SE-ACZ, named Värmland, of Swedish airline AB Aerotransport, at Fornebu airport in Oslo on its opening day, June 1, 1939. Captain Ernst Tage Joneberg flew the aircraft out of the brand new airport that evening, on a scheduled service to Gothenburg, Copenhagen and Malmö. In the background is Fornebu's distinctive restaurant rotunda. The number "3" on the wall to its right indicates the runway to be used.

SAS MUSEUM VIA AUTHOR



75 years ago a new long-awaited international airport for Oslo was opened at Fornebu, an undertaking that had involved blasting a million cubic metres of rock from the local mountains to create a state-of-the-art airport for the Norwegian capital. European airline historian **ROB MULDER** details the history of the airport from its planning to its capture by German forces in April 1940

A REGULAR TOPIC of discussion in Norway during 1919–34 was whether the city of Kristiania (which reverted to its ancient name of Oslo in 1925) needed a combined land- and seaplane port and if so, where. Up until the mid-1930s, landplanes had used Kjeller, a military airfield just north of Oslo, which had customs facilities. Seaplanes used Gressholmen, situated on an island in the Oslo Fjord. In 1927 German airline Deutsche Luft Hansa inaugurated the first international air service out of Norway with its Oslo—Gothenburg—Copenhagen—Stettin route, mainly operating with twin-engined Dornier Wal flying-boats, supplemented with Superwals and Junkers-G 24s.

In 1934 Deutsche Lufthansa (the airline's name was altered in the summer of 1933) switched the service from flying-boats to Junkers Ju 52/3m floatplanes. When the latter were undergoing overhaul, landplanes would replace the trimotor floatplane with services to the large field at the military camp at Gardermoen, or the airfield at Kjeller.



Construction of the airfield at Fornebu required an unprecedented effort from the local workforce, including the clearing of woodland and levelling of the ground. The poles here indicate the height to which the land had to be filled before building work could begin.

BAERUM COLLECTION VIA AUTHOR



The first international route operated by a Norwegian company (Halle & Peterson) was the night airmail service from Oslo to Gothenburg and Copenhagen, operated during 1929–31 with D.H.60M Moths, with only limited success.

Back in 1919 Norway's *Lufttrafikkommisjon* (Air Traffic Commission) had prepared a report which stated that a combined airport for land- and seaplanes would be ideal for Oslo, but that the huge investment required was not available. Norway at that point was a rather poor country, with somewhat limited financial means. During the 1920s the country suffered a serious banking crisis, but managed to stabilise itself financially before the depression of the 1930s, although the latter saw high figures in unemployment.

In the early 1930s a new committee, consisting of members of the Norwegian Government and the Municipality of Oslo, investigated the possibilities of a new airport. In July 1933 the committee came to the conclusion that a site at Fornebu, five miles (8km) from the city centre, was the best location for a combined land- and

seaplane airport. The financial costs were to be covered by the Norwegian Government and Oslo in equal parts.

On November 29, 1933, the conclusions of the commission were accepted and a request was made for a calculation of the costs to be presented within a few months. On July 6, 1934, the plans and calculations were approved in a meeting that was held in secret in order to avoid driving up property prices. That September the city of Oslo concluded the purchase of 915,000m² (nearly 10,000,000ft²) of land from the owners of Fornebu Farm. The plans were formally presented and were approved by Royal Decree on September 21, 1934. The following month construction began, ground being broken for the first time on November 20.

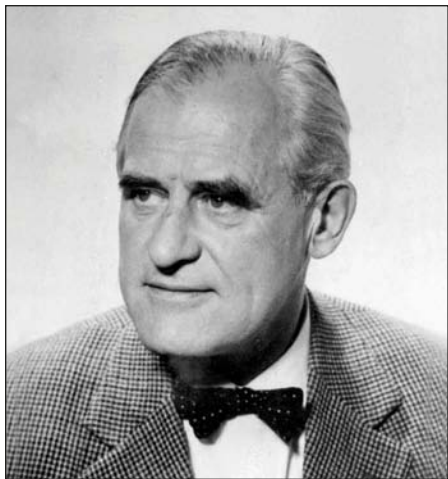
UNEMPLOYMENT BENEFITS

After a short while it was decided that the initial building phase would be extended in order to create more work for local construction workers over the winter, when work was scarce. At

The main runway at Fornebu being rolled with an 18-ton roller-compactor in 1938. That June, Capt Bjarne Øen, who would become the airport's first station manager, made the first landing on the runway in a military de Havilland Tiger Moth.

BAERUM COLLECTION VIA AUTHOR





ABOVE In 1939 architect Odd Nansen established a network to help Jews fleeing Nazi Germany; he later became part of the Norwegian resistance during the war. **RIGHT** Junkers Ju 52/3m D-ATON at Fornebu on September 7, 1938. Far from being a “secret reconnaissance mission”, it was co-organised by Norwegian airline DNL.



the same time several airlines showed a keen interest in opening services from Oslo once the airport was ready. The original plans were revised and a new expansion plan for the airport was approved on July 1, 1937, its area increasing from the original 311,000m² (3,348,000ft²) to some 462,000m² (nearly 5,000,000ft²).

The revised airport plan specified three 40m (130ft)-wide runways, two with lengths of 800m (2,625ft) and one of 700m (2,300ft). The amount of rock to be blown out of the mountains for the airport's construction increased from 870,000m³ (nearly 31,000,000ft³) to 920,000m³ (nearly 33,000,000ft³). The plan called for 8,000m² (86,000ft²) of tarmac surfaces, which would include a 20m (66ft)-wide taxiway between the landplane airport and the seaplane port, which was named Rolfstangen.

Norwegian architect Odd Nansen was engaged for design work on the new airport's terminal and hangar, although his initial schemes were rejected for being rather too modern. He subsequently tempered the design to create a more standardised terminal building, similar to that at Stavanger/Sola airport. The terminal incorporated two floors and a temporary wooden restaurant; the main building included a connection to a large 30m (100ft) x 100m (330ft) hangar, which housed maintenance workshop facilities and an administration block. Construction of the wooden restaurant was started first. Nansen supervised work on the airport buildings until the German occupation of Fornebu in April 1940.

The cost of the construction of the airport was enormous, although the labour costs were

seen as a form of benefit payments for local unemployed construction workers. The number of airport project workers reached its highest point during the winter months of 1934–35, when construction work elsewhere was scarce. Conversely, the number of airport workers decreased during the summer months. In March 1935 the peak of 1,380 workers was reached. It was hard manual labour; the broken rock from the construction site had to be removed by hand and placed in a wheelbarrow or small railway car, which then transported the stone away to be crushed. Much of the rock was re-used to level hilly terrain and fill up holes. Later, heavy equipment was introduced, but during 1934–37 most of the work was done by hand.

By the autumn of 1937 the terrain had been levelled and work on completing the new airport could be started. The runways and taxiways were made ready and needed only a final layer of small stones and asphalt. The latter work was put on hold for the winter and it was not until May 1938 that it recommenced. On October 20, 1938, the airport was declared ready for use.

AN EARLY VISITOR

The previous month, on Wednesday, September 7, 1938, shortly before 1800hr, Capt Loitz landed Junkers Ju 52/3m D-ATON, named *Erwin Böhme*, on Runway A/B (its original designation; it was soon redesignated Runway 1/5), the aircraft taking only 150m (495ft) to stop. This occasion is often described as a “secret espionage landing”, taking place as it did some nine months before the airport's official opening, but this is not true.

The event had been organised by *Det Norske*



ABOVE An aerial photograph of Fornebu during its construction. The main runway, originally designated A/B but quickly changed to 1/5, is furthest from the camera running from left to right; directly ahead is runway 6/2 and runway 7/3 has yet to be completed. The rotunda may be seen to the right of the taxiway parallel to runway 1/5.

Luftfartsselskap Fred Olsen & Bergenske A/S (DNL — Norwegian Air Lines) and Deutsche Lufthansa. Indeed, a large welcome committee awaited the aircraft's arrival, which was operating on the regular Copenhagen—Gothenburg—Oslo (Kjeller) service. The Junkers had dropped off its passengers at Kjeller and taken new ones aboard for the flight to Fornebu, including DNL Office Manager Johan Wulfsberg and a representative of Swedish airline AB Aerotransport (ABA), Lennart Jansson. Also present were DNL Director Hjalmar Riiser-Larsen, Capt Bjarne Øen (a member of the 1932 airport committee) and Norway's Minister for Social Works, Oscar Torp. Official photographs were taken in front of the aircraft, and Deutsche Lufthansa representative Hans Schäfer announced that a Focke-Wulf Fw 200 Condor service between Oslo and London would be inaugurated the following year. After a short stay, Loitz and his crew returned in the Junkers to Kjeller. Øen, who had flown a de Havilland Tiger Moth from Kjeller to Fornebu in the summer of 1938, was appointed Station Manager at Fornebu that December, remaining in the position until April 1940.

During the winter of 1938–39 work on the airport continued apace. Øen busied himself with the recruitment of staff for airport administration, air-traffic control and groundcrew. Ground operations at Fornebu would be handled by DNL, while the *Postvesen* (Norwegian Post Office) would handle the mail. Customs and passport control was to be undertaken by Customs Duty Officers,

while the *Meteorologisk Institut* (Meteorological Institute) would provide the weather service. Radio and telegraphic services were to be provided by *Telegrafverket* (Telegraphic Office). The Norwegian government would pay for the transfer of a radio mast and construction of an office with a total budget of 300,000 kroner.

In November 1939 a new Adcock radio-aerial array was installed at Fornebu and the training of personnel started. The telegraphic office was housed in temporary wooden barracks, as none of the administration offices would be ready until the summer of 1940 at the earliest. To the north of the restaurant further provisional barracks were erected for DNL, post office and airport administration personnel. In the late autumn of 1939 the construction of the administration building and the erection of the large hangar started.

INTO SERVICE

On June 1, 1939, Fornebu was declared open, although there was no official ceremony, which was planned for the summer of 1940. Nevertheless, a number of aircraft arrived to mark the opening of the new airport and/or inaugurate new air services from Oslo.

The previous day Focke-Wulf Fw 200 Condor OY-DAM *Dania* of *Det Danske Luftfartsselskab A/S* (Danish Air Lines — DDL) had arrived, followed by KLM Douglas DC-2 PH-AKI *Kieviet*. From Germany Emil Kropf arrived in his Fieseler Fi 156C-1 Storch, D-IUGR, an aircraft well-known for its short take-off and landing characteristics. Also on the ramp was DNL's chartered Caproni



ABOVE Opening day, June 1, 1939; as well as the various airliners on show, three privately-owned aircraft were on hand to celebrate the airport's inauguration. They were Taylor J-2 Cub LN-EAN (the tail of which is visible here), Taylorcraft A LN-FAG and Fairchild 24 LN-EAF. In the background is DNL's Caproni Ca 310 LN-DAK Brevduen.

Ca 310, LN-DAK, ready to take off for the company's first landplane night airmail flight.

On the opening day a few smaller aircraft arrived, including Taylor J-2 Cub LN-EAN and Fairchild 24 LN-EAF, both belonging to *Wessels Flyveselskap A/S*. A privately-owned Taylorcraft A, LN-FAG, belonging to Lars Berge, also flew in later in the day. At the seaplane jetty DNL's Junkers Ju 52/3m, LN-DAI *Hauken*, was moored, the aircraft going on to earn the distinction of performing the new airport's first official departure early that morning, although the seaplane base had seen a number of scheduled departures over the previous month.

The Junkers floatplane trimotor had opened the season from the seaplane base at Fornebu on April 16, flying Air Service No 27 from Oslo

via Gothenburg to Copenhagen. On the evening of April 18, DNL's Junkers-W 34 floatplane, LN-DAB *Ternen*, had departed from Fornebu to inaugurate the airline's night airmail service to Copenhagen, both aircraft operating regularly from Fornebu in the days before the opening.

At 0735hr on June 1, Ju 52/3m floatplane LN-DAI took off for the first non-stop flight between Oslo and Bergen, to make the first official flight from Fornebu. From there the slow but sure trimotor would continue to Haugesund, Stavanger and Kristiansand, where passengers connected with the KLM/DNL Oslo—Kristiansand—Amsterdam pooled service.

The honour of making the first official landplane departure from Fornebu on a scheduled service fell to DDL Fw 200 Condor

German aviator Emil Kropf arrived the day before the opening in Fieseler Fi 156C Storch D-IUGR (c/n 695), remaining at Fornebu until June 4. The new airport presented no problems for the Storch and its extraordinary short-field performance.

SAS MUSEUM VIA AUTHOR





ABOVE On April 16, 1939, the first service from Fornebu's seaplane base, Rolfstangen, was flown by DNL Junkers Ju 52/3m LN-DAI Hauken, from Oslo to Copenhagen. The same aircraft made the first official flight from Fornebu on the opening day, June 1, departing the airport early in the morning for Haugesund, Stavanger and Kristiansand.

OY-DAM. After the four passengers had boarded, Capt Charles Bramsen started the elegant airliner's four BMW engines and taxied to what he thought was the runway. He pushed the throttles fully forward for take-off, noticing shortly thereafter that the runway was rather short; he was in fact on the taxiway. Fortunately the Condor was lightly loaded and Bramsen managed to avoid ploughing into a shed at the end of the taxiway, where a startled carpenter was working. Happily, the airport's first official day of business did not end in disaster.

The next departure was KLM DC-2 PH-AKI, its aircrew comprising Danish-born First Officer Svend Steinbeck and Norwegian Second Officer Bernt Balchen (DNL's Technical Manager). The Douglas transport departed for Kristiansand

and Amsterdam on Air Service No 1713, another pooled air service operated by KLM and DNL. Both departures were prefaced by speeches from nobilities such as DNL Director Hjalmar Riiser-Larsen and Oscar Torp (also chairman of the airport committee). Steinbeck was presented with a small doll in traditional clothing from the Setesdal Valley in southern Norway, to give to Princess Beatrix of the Netherlands.

It was not just a day of departures, however; there were arrivals at the new airport from all over Europe. Dutch airline KLM sent one of its most experienced airmen, First Officer Iwan Smirnoff, to make the first scheduled landing at Fornebu from Amsterdam, in Douglas DC-2 PH-AKH *Haan*. Before landing Smirnoff circled above Oslo while trying to locate the correct

BELOW KLM Douglas DC-2 PH-AKI Kievit (c/n 1355) is the subject of great interest before its departure from Fornebu for Kristiansand and Amsterdam on June 1. This aircraft was taken over by German forces in May 1940, after which it was given the German civil registration D-ADBK and later served with the Luftwaffe as NA+LD.

SAS MUSEUM VIA AUTHOR



A splendid image of DDL (Danish Air Lines) Focke-Wulf Fw 200 OY-DAM Dania starting its engines for the first landplane departure on a scheduled service from Fornebu, on June 1, 1939. The flight departed Oslo for London via Gothenburg, Copenhagen and Hamburg, the service being provided in association with Deutsche Lufthansa.

SAS MUSEUM VIA AUTHOR





ABOVE LEFT Passengers board Fw 200 OY-DAM on June 1. **Furthest right, in uniform, is DNL Station Manager Oddvar Steen.** **ABOVE RIGHT** From left to right: Svend Steinbeck (KLM's Danish captain); Bernt Rom (KLM's representative in Denmark) and Hjalmar Riiser-Larsen (DNL Managing Director) on the opening day at Fornebu.

runway at Fornebu. Deutsche Lufthansa's Captain Otto Platz was at the controls for the first Fornebu landing of a German Fw 200 Condor, D-AMHC *Nordmark*, on Air Service No 27 from London, which the German airline operated in association with DDL.

There were more departures in the afternoon; Capt Ernst Tage Joneberg inaugurated AB Aero-transport of Sweden's new landplane service, departing in blue-painted Fokker F.XII SE-ACZ *Värmland* for Gothenburg, Copenhagen and Malmö. A quiet period followed at the airport until Capt Niels Steen took off in the evening in DNL Caproni Ca 310 LN-DAK *Brevduen* with the airmail for Copenhagen.

OPEN FOR BUSINESS

That summer Norwegian non-scheduled operator *Widerøe's Flyveselskap A/S* used Fornebu for training flights, as did *Wessels Flyveselskap*. During 1939 the following aircraft operated from Fornebu: Fairchild 24 LN-EAF; Stinson Reliant LN-EAM; Taylor J-2 Cubs LN-EAN and LN-EAT; Klemm Kl 35 LN-EAV; Hønningstad Norge 1 LN-FAM and Götaverken GV.38 LN-FAP. In 1940 Piper J-4 Cub LN-FAR was added.

Despite the lack of a hangar, the new airport was also home to several privately-owned aircraft, including glider-builder Bjarne Carlen's Schneider Grunau 8, LN-ABT and Lars Bergo's Taylorcraft, LN-FAG. Robert Hesselberg Meyer (the owner of *Hesselberg A/S*, which had laid the asphalt on the runways) flew LN-FAP, his Götaverken GV.38 (licence-built Rearwin 9000-L Sportster), from Fornebu until September 1939, when *Widerøe* took over the aircraft. Waco YKS-7 LN-EAO, owned by K.F. Oppegaard, was also kept at Fornebu.

The first recorded visit to Fornebu by a non-

European-built aircraft had in fact been made some time before the opening of the new airport. On May 19, 1939, Swissair's chief pilot Ernst Nyffenegger landed Douglas DC-3 HB-IRA on the new runway, the aircraft carrying a Swiss delegation on a tour of Scandinavia and the Baltic. The party had already visited Copenhagen and Stockholm and departed Fornebu the following day.

On July 8 Belgium's national carrier Sabena flew the airline's managing directors from Brussels to Oslo in SABCA-built Savoia-Marchetti SM.73P OO-AGZ, to investigate the possibilities of services to the Norwegian capital. The chairman of DDL's Board of Directors, Gunnar Larsen, flew his own Focke-Wulf Fw 58 Weihe, OY-DYS, to Oslo twice that July.

Foreign visitors made regular pilgrimages to





Passengers disembark from a coach beside the restaurant rotunda and make their way towards DC-2 PH-AKI for the flight to Amsterdam on June 1. Thankfully the weather on the opening day was excellent and no flights were delayed.

the new airport. On July 3–4 a pair of Percival Vega Gulls — OO-ATY, flown by Belgian architect Andrée Bauwens, and HB-OMO, flown by Swiss pilot M. Weber — arrived at Fornebu.

PRELUDE TO INVASION

Other visitors over the summer included Swiss Messerschmitt Bf 108 HB-EKU; a Caudron C.600 Aiglon, F-AOKR, and Farman F.403 F-AODY from France; a Gotha Go 150, D-ESBF, from Germany and a British Percival Q.6, G-AFGX. An exotic foreign visitor was de Havilland D.H.87B Hornet Moth VR-RAI of the Malaysian Flying Club, flown in by Mr L.K. Pay. Other visitors included two Götaverken GV.38s, SE-AHG and SE-AHH, and an example of the Danish-designed and -built SAI KZ.IIS, SE-AKA, which belonged to the Royal Swedish Aero Club.

On August 23, 1939, KLM withdrew its service to Fornebu from Amsterdam owing to the mobilisation of its pilots in the Netherlands, as war clouds began to gather over mainland Europe. The Oslo service was resumed on the 31st, but was closed again the following day in light of Germany's attack on Poland. The service was resumed again between September 7 and October 31, and again during April 1–8, 1940.

British Airways also started a new service connecting Newcastle (this was later changed to Perth in Scotland) with Stavanger, Oslo, Stockholm and Helsinki, using Ju 52/3ms and Lockheed 14s. Initially Oslo was omitted from the route, as the British pilots were unhappy about the density and height of the trees on the approach to the main runway at Fornebu. This was addressed, however, and Oslo

On the inaugural day of the airport Captain Charles Bramsen opened the throttles of DDL Fw 200 OY-DAM and — unintentionally — roared off down one of the taxiways and into the air, only realising halfway through the run that he was not in fact on the runway.

SAS MUSEUM VIA AUTHOR





ABOVE In the autumn of 1939 British Airways started a service from Newcastle to Scandinavia using Ju 52/3ms. Despite initial concerns about Fornebu's treeline, the airport was ultimately incorporated into the route. Ju 52/3m G-AERU Juno was operated on the service and is seen here at Stavanger. It later served in the Congo with Sabena.

was thereafter included on an irregular basis.

On October 16, 1939, DNL inaugurated its first landplane passenger service, to Gothenburg and Copenhagen, using Ju 52/3m LN-DAF *Najaden*, the machine's floats having been replaced with a wheeled undercarriage. The trimotor operated the service daily until April 8, 1940. The following day Germany launched its invasion of Norway, and Fornebu was occupied by German troops in the early hours of that morning.

Neither KLM's DC-3 PH-ASK *Kemphaan*, under the command of Capt Evert van Dijk, nor British Airways' Ju 52/3m G-AFAP *Jason*, was permitted to leave that day. The Dutch pilot was eventually allowed to return to Holland on April 14, but the British aircraft was confiscated by the Germans, the crew fleeing to neutral Sweden.

Throughout the war Deutsche Lufthansa

operated DC-3 and Ju 52/3m services from Fornebu to Copenhagen and Berlin, and, during 1941–42, to Stockholm, Helsinki, Pori and Rovaniemi. The last wartime flight of a German civil aircraft from Fornebu was made by Ju 52/3m D-AFFF *Jakob Leuzinger* on May 8, 1945, when it departed for Ålborg in Denmark.

After the war the airport was occupied by British forces, and air services out of Fornebu were initially supervised by *Norges Luftfartstyret* (Norwegian Air Council) until new arrangements could be made, DNL's original concession having expired on April 30, 1945.

Fornebu went on to become Oslo's main international airport until October 1998, when the historic field was closed down and all movements were transferred to the new airport at Gardermoen.

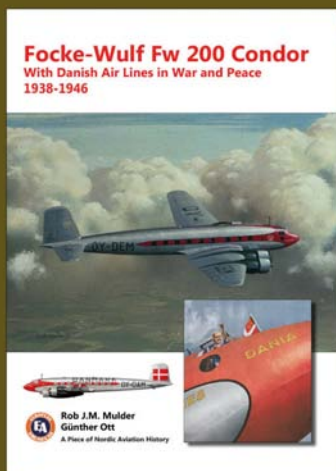


On October 16, 1939, DNL inaugurated its Oslo—Gothenburg—Copenhagen service from Fornebu, using former Ju 52/3m seaplane LN-DAF *Najaden*, which had been fitted with a wheeled undercarriage. It was DNL's first landplane passenger service.

KAY HAGBY VIA AUTHOR



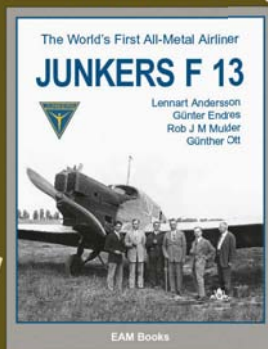
SCANDINAVIAN AVIATION HISTORY AT ITS BEST!



The latest book from European Airlines RM digs deep into the archives to provide the definitive account of the careers of the two Focke-Wulf Fw 200 Condors purchased by Danish Air Lines (DDL) in 1938. Details of all the Condors acquired by civil operators before and after World War Two are also included. Profusely illustrated with more than 220 photographs, numerous vintage brochures and timetables, and featuring ten new specially-commissioned colour artworks by Juanita Franzzi, this 160-page hardback book is by far the most detailed history of these aircraft yet published. Price: € 24,95 + p&p (Euros).

"That the history of two aircraft flown during a few years before, during and after the war can result in a 160-page book, says a lot about Rob Mulder and Günther Ott's research" - Christian H.F. Kamhaug, FlyNytt, September 2013

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ARMCHAIR AVIATION

We take a look at what's available for the aviation history enthusiast in the world of books and other literature, from hot-off-the-press publications to reissued classics

The Grumman Amphibians: Goose, Widgeon & Mallard

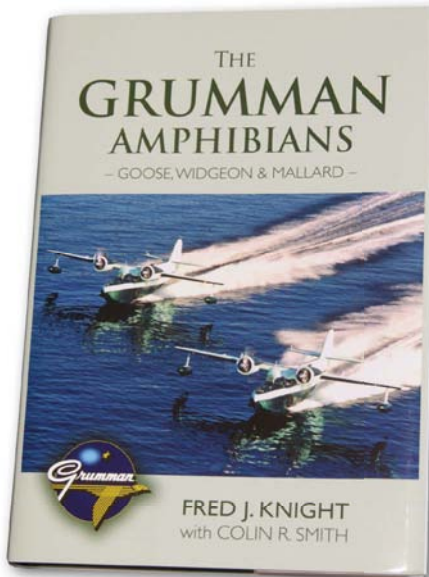
By Fred J. Knight with Colin R. Smith; Air-Britain, 41 Penshurst Road, Leigh, Tonbridge, Kent, TN11 8HL, available online at www.air-britain.co.uk/actbooks/acatalog; 8½in x 12in (216 x 305mm); hardback; 480 pages, illustrated; £34.95 to Air-Britain members, £49.95 to non-members. ISBN 978-0-85130-440-3

IF YOU ARE reading this journal, then you have more than a passing interest in the history of aviation; indeed, the chances are that your abiding passion is more akin to an all-consuming affliction than a mere pastime. In which case you are already a member of Air-Britain — if not, then you should be.

Formed by a group of dedicated enthusiasts in July 1948, Air-Britain has a publishing list unsurpassed by any other aviation organisation in the world, and continues to provide a programme of reliable research data on every aspect of aviation to its members on a regular basis.

Part of the latest batch of Air-Britain publications is this substantial reference work on Grumman's Goose, Widgeon and Mallard amphibians (the military Albatross will be the subject of a future Air-Britain volume), of which some 721 were built, including 41 by SCAN under licence in France.

The idea for a small, versatile personal transport aircraft that could operate from land and water was first mooted in the mid-1930s by a syndicate of well-off New York-based businessmen who wanted to commute from their Long Island estates to their waterfront offices on Wall Street. The syndicate approached (the much undersung) designer Grover Loening, who was working for



Grumman as a consultant, and who had established a reputation as something of a genius with amphibians. By the spring of 1936 Loening had convinced Leroy Grumman, himself a strong advocate of amphibian aircraft, that the premise was sound and production of the Grumman G-21 was started on the promise of at least ten orders from the syndicate. The prototype made its first flight in May 1937, and the first "Grey Goose", as the Grumman boss dubbed it, was delivered that July. It was to be the beginning of a production run of 345 Gooses (Geese? Geeses?), the majority of which donned

uniform to serve with the military, although many also enjoyed long careers with civil operators after the war.

The success of the Goose led to the development of a similar type that was more affordable and with lower operating costs. Enter the smaller G-44 Widgeon, designed for businessmen and those who enjoyed outdoor pursuits like hunting and fishing, but which ultimately also found favour with the military and saw service with American air arms and the RAF throughout World War Two.

The final variant included here is the G-73 Mallard, which was developed in the opposite direction as a scaled-up version of the Goose for use by smaller regional airlines in the anticipated post-war economic boom. It was a boom that did materialise, but with thousands of twin-engined surplus military aircraft being made available at depots all over the USA at rock-bottom prices, the Mallard struggled to find a market; and thus only 59 were built, despite the type being arguably the most attractive amphibian ever built.

Air-Britain doesn't do things by halves, and this

lovingly crafted and extremely well-researched tome is no exception; it is the nearest thing to a definitive account of these aircraft that is ever likely to surface. The authors freely admit that “not all the official documentation is available [and] it is recognised that some questions remain unanswered”, but the level of investigation into what does exist is forensic.

As usual for this publisher, the paper quality is exceptional and the large well-reproduced photographs and memorabilia (colour examples of which are displayed in a special section) are used in all the right places to support the story at the right point — a technique all-too-often forgotten by some publishers, but which adds greatly to the reader’s experience.

The book is divided into easily-digestible chapters, the narrative early examples of which are just right — neither too long to be daunting nor too short to be rich in detail — including the development of each type, modifications and projects and what they were like to fly, before moving on to what Air-Britain does better than anyone else — the comprehensive production lists. Performance and engine data, plus details of the trio’s various type certificates and design numbers, are also included.

Air-Britain has long been renowned as the “go-to” publisher for definitive aviation history, and *The Grumman Amphibians* continues that long and noble tradition. As an aside, your reviewer can attest that, weighing in at more than 2¼kg, it also doubles as a highly effective doorstop . . .

NICK STROUD

Air and Sea Power in World War I: Combat and Experience in the Royal Flying Corps and the Royal Navy

By Maryam Philpott; I.B. Tauris & Co Ltd, 6 Salem Road, London W2 4BU; 5¼in x 8¼in (146mm x 222mm); hardback; 268 pages; illustrated; £59.50. ISBN 978-1-78076-151-0

THE AUTHOR HAS a degree in history and education, and this book results from her doctoral thesis, which “examined the experience of the Royal Flying Corps and Royal Navy in the Great War”. While I cannot comment on naval aspects, I feel justified in passing judgment on the aviation aspects, and I am disappointed.

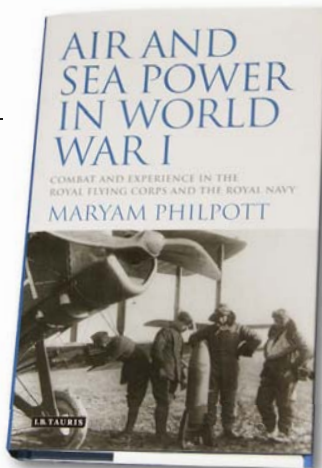
Although the author is essentially dealing with the human experience of war, it needed to be done with some informed understanding of the equipment and machinery with which the personnel in these Services were intimately involved as a matter of daily routine. References to “Sopwith” and “Albatrosse” aeroplanes, a “BE26”, “Graeme-White” and “C.F. Snowden” (rather than C.F. Snowden Gamble) did nothing to persuade me that the writer had such understanding, and my fears worsened when I read that “the leading aircraft manufacturers, such as De Havilland, developed bomber aeroplanes at the Royal Aircraft Factory and at the Aircraft Manufacturing Company (AIRCO) for the Flying Corps”. The description of a Zeppelin as “an enormous bag of hydrogen, the size of a dreadnought, with a small cockpit attached to the bottom from which the pilot steered the vessel” is childish in its naïvety, and the attempt to describe the evolution of machine-gun interrupter gear is nonsensical.

I am sure that many would dispute the author’s contention that “accounts of the RFC fall broadly into two categories — veteran accounts and enthusiast histories, the latter being concerned with aeroplanes and engine specifications rather than pilots. Few historians have recorded or understood the war record of this service and the cultural existence of the airman in France and Belgium”. While the author extols the

virtues of oral history records and archived personal memoirs, a study of her quoted sources reveals that the majority of her numerous quotations are taken from published autobiographies and biographies with which most students of the period will be familiar, and the linking text also depends heavily on other published works. Moreover, nothing could have better depicted the working conditions, social life and rigours of wartime RFC personnel than a good selection of informatively captioned period photographs, of which there is no shortage, to accompany the recollections, but the book is devoid of illustrations.

For me, this volume is merely further proof that recognition in academia and endorsements by fellow professors are no guarantee of good and useful research. If you have not already been put off buying this book, its outrageous price should be the decider.

PHILIP JARRETT



The First World War in 100 Objects

By Gary Sheffield; André Deutsch, Carlton Publishing Group, 20 Mortimer Street, London W1T 3JW; 9½in x 8in (245mm x 195mm); hardback; 256 pages, illustrated; £25. ISBN 978-1-78097-396-8

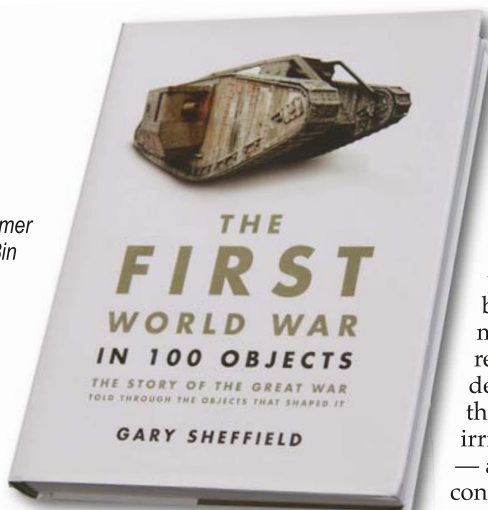
WRITTEN BY THE Professor of War Studies at Wolverhampton University, and published to mark the centenary of the outbreak of World War

One, this beautifully-produced book covers a lot of ground — although inevitably rather less sky, with just five of the 100 objects clearly relating to aviation rather than to army or naval subjects. Shamelessly riding the coat-tails of British Museum Director Neil MacGregor's wonderful 2010 book *A History of the World in 100 Objects*, it is none the worse for that lack of originality, although it lacks the latter's almost hypnotic, lyrical style (perhaps because it did not begin as a series of short talks for radio).

Each object commands a double-page spread, with illustrations mostly on the right and accompanying text on the left. Every so often a relevant pictorial spread is inserted to add to the visual appeal. A typical aviation entry is headed "Flying Helmet", and includes a photograph of a preserved 1920s leather helmet "very similar to those in use during the First World War" — no actual Great War helmet available to be photographed, then? Less than halfway through the accompanying text the author abandons the subject at hand and skips off into the role of aviation in war, then artillery spotting, then artillery bombardments in general, then fighter pilots.

Other aviation entries cover the Zeppelin, the observation balloon, Richthofen's Fokker triplane and Goering's Fokker D VII — two German aces eclipsing any Allied pilots, VC-winners included; although Ball, Rickenbacker and Guynemer get passing mentions on the flying-helmet page.

On pp180–181 a glorious double-page glass-neg photograph of a Farman F.40 reconnaissance aircraft is rather carelessly captioned: "This biplane from circa 1917 was fitted with both a



wireless set and a machine-gun" — informative, but only up to a point.

If this review comes across as increasing in peevishness between beginning and end, it merely reflects how my own response to the book developed as I looked through it and became irritated by points of detail — an almost inevitable consequence of a relatively specialist reader looking at a relatively general book. It is

nevertheless an entertaining, wide-ranging volume that merits a good browse.

MICK OAKEY

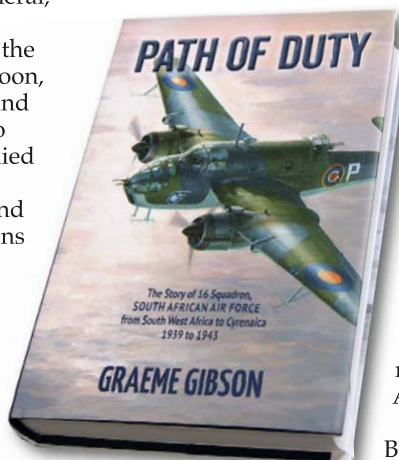
Path of Duty: The Story of 16 Squadron South African Air Force, from South West Africa to Cyrenaica, 1939 to 1943

By Graeme Gibson; self-published, available from graemegibson6@bigpond.com; 7in x 10in (176mm x 250mm); hardback; 489 pages, illustrated; AU\$88. ISBN 978-0-64655-633-8

THE SOUTH AFRICAN Air Force's No 16 Sqn has never had its history written before. The unit is not widely known outside its mother country but this does not make it any less important. And what a history it is. Name some of the more obscure actions and campaigns in Africa during World War Two and it is highly likely that No 16 Sqn was involved.

First created to patrol the south-western Cape early in the war (South Africa wanted to be seen to be ready for war even though it was not), the unit's first incarnations were short-lived. It was not until the campaign against the Italians in Abyssinia (now Ethiopia) that the unit finally gained some permanence. Flying Junkers Ju 86s, including former South African Airways aircraft, the squadron played a major part in removing the Italians from East Africa before disbanding.

The unit reformed with Bristol Beauforts and Martin Marylands



and participated in the invasion of Madagascar, before moving to Kenya and returning to its roots flying Bristol Bisleys on maritime patrols. North Africa beckoned in early 1943 and, with the arrival of Bristol Beaufighters, the unit became a strike squadron.

This first volume — part of a planned trilogy — records the unit's history up to this point. (The second volume, *Road To Glory*, is well advanced.) Far from being a dry history, the narrative is masterfully crafted to be both readable and informative. Artwork, including paintings, profiles and pencil sketches, has been specially commissioned for the book. The colour plates are glorious, with exceptional colour reproduction, and, combined with the narrative, bring the book to life. The evocative sketches and paintings by South African artists Sean Thackwray and Darryl Legg illustrate many of the scenes for which photographs are not available, and are excellent.

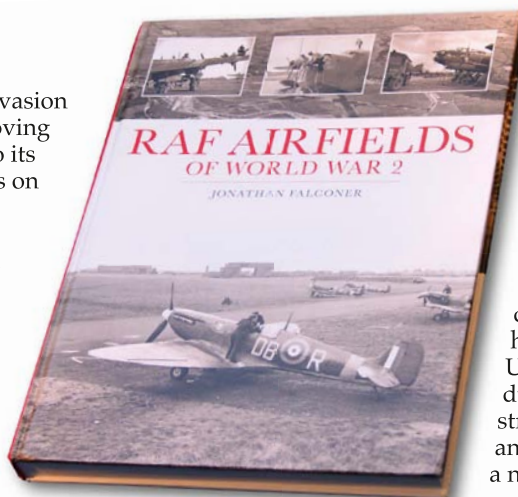
Appendices provide airframe histories for all aircraft used in the period covered by the book and the bibliography is an education in itself. The paper stock is of a high quality and the photographic reproduction is perfect. At almost 500 pages this is not a small book, but it is certainly manageable and the whole package is an absolute delight.

ANDY WRIGHT

RAF Airfields of World War 2

By Jonathan Falconer; Midland Publishing, Hersham, Surrey KT12 4RG; 8½in x 11¼in (210mm x 298mm); hardback; 320 pages, illustrated; £35. ISBN 978-1-85780-349-5

A RATHER USEFUL reference, this well-produced volume, with its large and clear monochrome illustrations, has as its core an A-to-Z guide to nearly 400 RAF frontline airfields of the Second World War, the information for each one including basic data such as location, dates of opening and closure, Pundit Code, hangarage, etc; user squadrons and units; and the



aircraft they operated. In many cases, useful plans of the airfield layouts are included.

This core is preceded by an account of the RAF's airfield-building programme, including descriptions of the various hangar designs seen at the UK's operational airfields during 1939–45, the group structures of Fighter, Bomber, and Coastal Commands, and a note on advanced landing grounds. At the back of the book a section titled *The Human*

Dimension presents a collection of personal recollections derived from a variety of sources.

Among the 12 appendices are listings of headquarters and AOC-in-Cs of Fighter Command and 2nd Tactical Air Force, strengths of Fighter Command and Air Defence of Great Britain, Bomber Command and Coastal Command home-based frontline units, and orders of battle.

The well-chosen illustrations, positioned at appropriate places in the text, have informative captions. All in all, this is a volume to keep close to hand if Second World War British Service aviation is your pet subject.

PHILIP JARRETT

How The Spitfire Won The Battle of Britain

By Dilip Sarkar; Amberley Publishing, The Hill, Stroud, Glos GL5 4EP; 4¼in x 7¼in (124mm x 198mm); softback; 192 pages, illustrated; £9.99. ISBN 978-1-84868-868-1

DILIP SARKAR IS a well-known and prolific aviation author, specialising in the Battle of Britain and the Spitfire, and, given his enthusiasm for both, it is perhaps unsurprising that he has linked them in the title of this book. This work is predominantly a concise history of the Battle, the events leading up to it and the development of the major fighter aircraft engaged in it. The system of air defence is also accorded a chapter to itself and explains the reasons behind the use of some of the outmoded tactics employed by Fighter Command.

The Battle of France and Operation *Dynamo*, the evacuation from Dunkirk, are given their due place in history.



There is a representative selection of combat reports to give a flavour of the Battle of Britain, and if the book stopped at the point of Churchill's famous tribute, it would be considered a workmanlike, if brief, account.

The final two short chapters of the book seem to have been added as an afterthought, presumably to seek to justify the title. The penultimate chapter, entitled *Spitfire Ascendant*, comprises just over three pages of quotations from pilots, several of whom, including Douglas Bader, made it abundantly clear that they preferred the Hurricane as it was a more stable gun platform, could absorb much more damage, was easier to repair and much easier to land and handle on the ground. It was acknowledged that the Spitfire had a higher top speed and ceiling, and a more glamorous appearance, and that may be why many Luftwaffe pilots claimed to have been shot down by a Spitfire, rather than a Hurricane. The author states, presumably to reinforce the argument that the Luftwaffe was in awe of the Spitfire, that the "Me 109F [sic], tellingly, had elliptical wings, like a Spitfire". This is patently incorrect. The wing on the Bf 109F had a straight taper, and merely added rounded wingtips to the original square ends. In fact its wing planform more closely resembled that of the Hurricane.

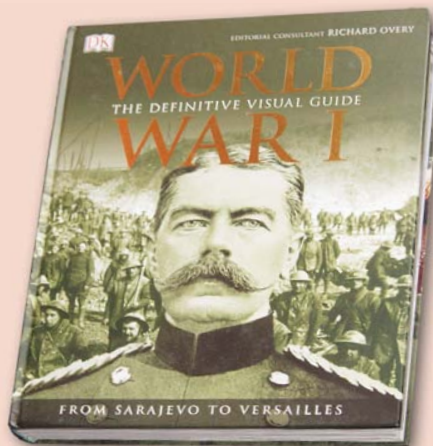
The final chapter seeks, through the use of statistics, to put forward the argument that had Fighter Command been equipped with Spitfires alone, it would still have won the Battle, but had it been equipped only with Hurricanes, it would have lost. It is not in dispute, even in this chapter, that the Hurricane was responsible for shooting down more enemy machines than the Spitfire. Based on the respective numbers in service of the two aircraft, it is argued that the Spitfire was proportionately more successful. No playing with figures can overturn what actually happened. The Battle of Britain was essentially a team effort in which the many players each performed an important role. The others included radar operators, the Royal Observer Corps, plotters, sector station staff, fitters, armourers, other ground personnel, repair mechanics, Air Transport Auxiliary pilots, anti-aircraft gunners and many more. Whether their roles were glamorous or mundane, each had an important part to play. It is therefore inappropriate to seek to single out a small group for disproportionate praise and to base the inaccurate title of the book on such a premise. The Spitfire did not alone win the Battle of Britain. It was merely one of the instruments, albeit a significant one, which together won that battle.

FRED CROSSKEY



BOOKS IN BRIEF

A quick round-up of what else is available for the aviation history enthusiast. This time we focus on the Great War . . .



WORLD WAR I: THE DEFINITIVE VISUAL GUIDE
R.G. Grant (Editorial Consultant: Richard Overy)
Dorling Kindersley; ISBN 978-1-40934-761-3; RRP £25

A characteristically sumptuous treatment of the "war to end all wars" aimed at the younger reader, densely packed with information and lots to look at

HOW TO FLY A PLANE

Captain Barber RFC
Amberley Publishing; ISBN
978-1-44563-583-5;
RRP £8.99

An attractively packaged reissue of Capt Horatio Barber's utterly charming First World War pilot's manual, in which he describes the basics of how to get to grips with these infernal new-fangled flying contraptions . . .



THE FIRST WORLD WAR REMEMBERED

Gary Sheffield
André Deutsch; ISBN
978-0-23300-405-1;
RRP £50

A very handsome slipcase-bound book containing authoritative text supported by 200+ photographs and colour maps, as well as more than 30 facsimile documents and a film DVD



Lost & Found


PHILIP JARRETT explores the lesser-known corners of aviation history, discovering unknown images and rediscovering long-lost details of aircraft, people and events. Here he investigates a photograph of a rather primitive, somewhat optimistic German biplane glider

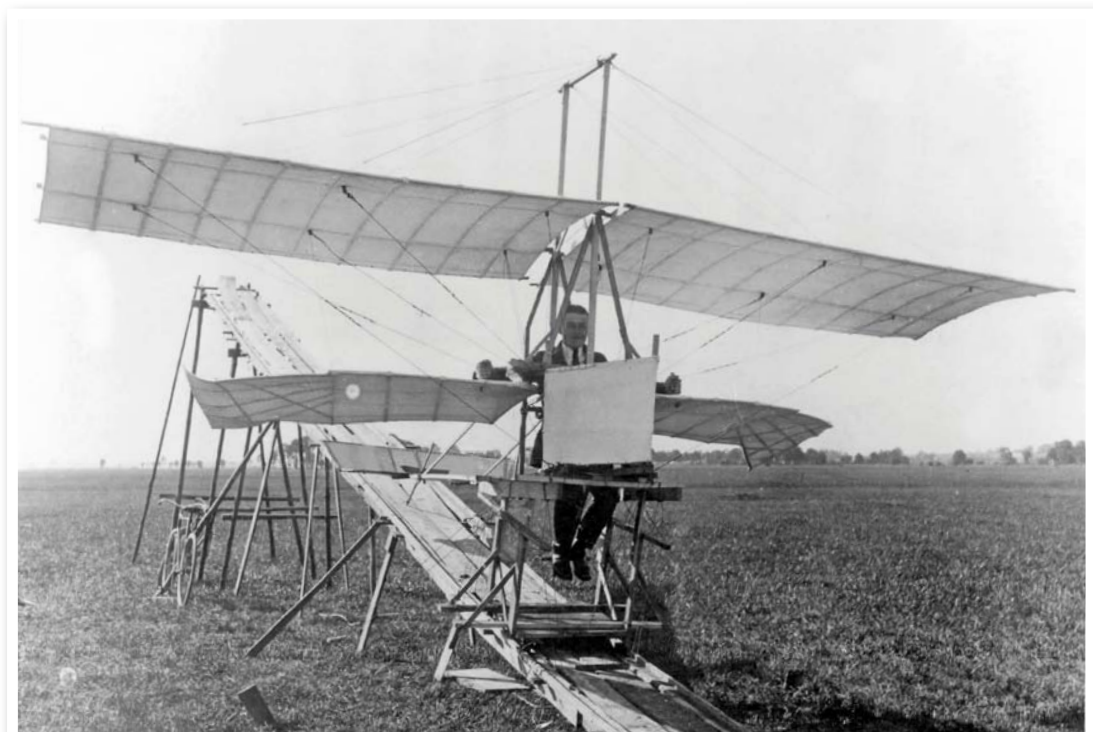
HERR GEORG FIEDLER of Alexanderdorf Kreis Teltow in Brandenburg, Germany, was born in 1899, and in 1942-43 was working for the Bucker Flugzeugbau GmbH at Rangsdorf, near Berlin. That is just about all I know about him, apart from the fact that, in his earlier years, he had evidently developed an enthusiasm for flying and, lacking the means to buy an aeroplane, decided to design and build one for himself. The rather singular biplane glider that resulted from his endeavours is seen in the photograph below, with its proud creator *in situ*.

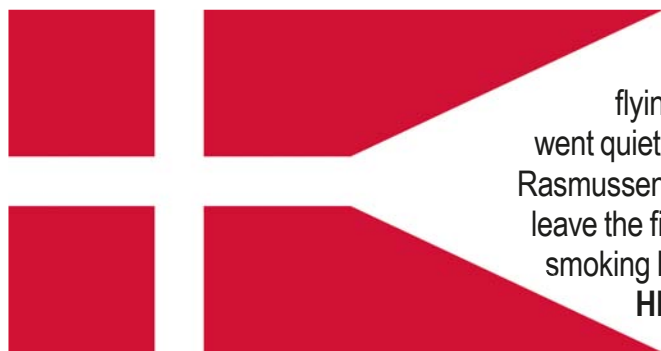
A study of the contraption shows that the ends of all of the wire bracing are simply taken through a loop and then twisted; there appear to be turnbuckles midway along the wires to allow them to be tensioned. Apart from the central section strutwork, incorporating a tall overhead pylon, there is no rigid bracing for the double-surfaced

wings. The tips of the shorter-span lower wing appear to have small triangular flexible tips to provide lateral control, and an elevator is carried on a short boom structure extending aft. There is no rudder. Unfortunately it is not possible to determine how Herr Fiedler's control system was operated. The intrepid would-be aviator has made a token gesture at streamlining by fitting a fabric-covered "prow" ahead of his body.

The machine is more or less a hang glider, and Fiedler evidently hoped to gain sufficient momentum for short glides by the use of the rather makeshift and rickety inclined launch ramp. To this end the glider is mounted on a wheeled carriage from which it would (hopefully) rise when sufficient speed was attained.

Unfortunately we have no date for this intriguing photograph; any further information on Fiedler's folly would be gratefully received by the Editor; contact info as per page 3 of this issue. 





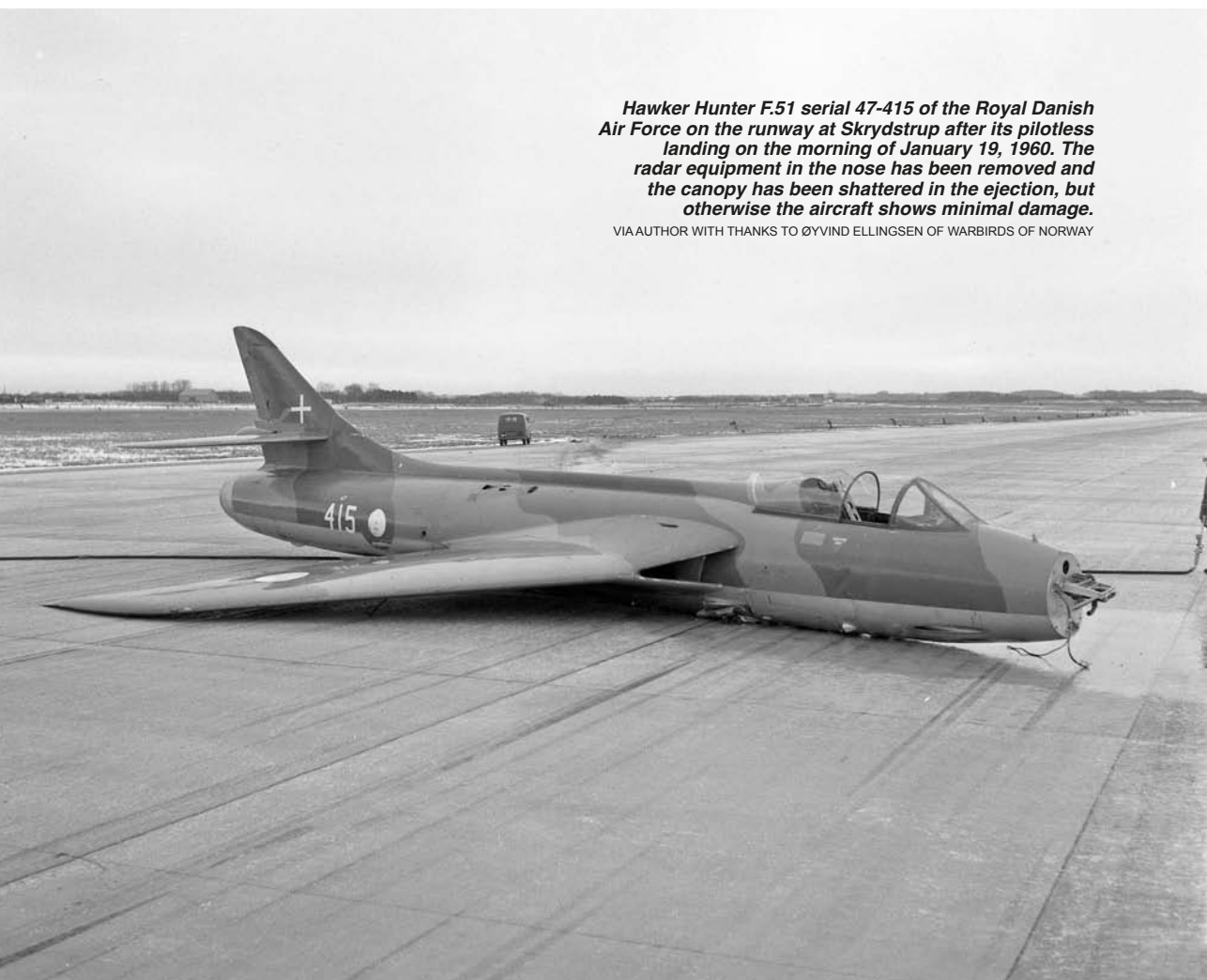
In January 1960 Royal Danish Air Force pilot Kurt Rasmussen was flying a Hunter on test when everything went quiet. With the engine refusing to relight, Rasmussen had no option but to “step out” and leave the fighter to its fate. There was to be no smoking hole in the ground, however. **NIELS HELMØ-LARSEN** shows how reality can often be stranger than fiction

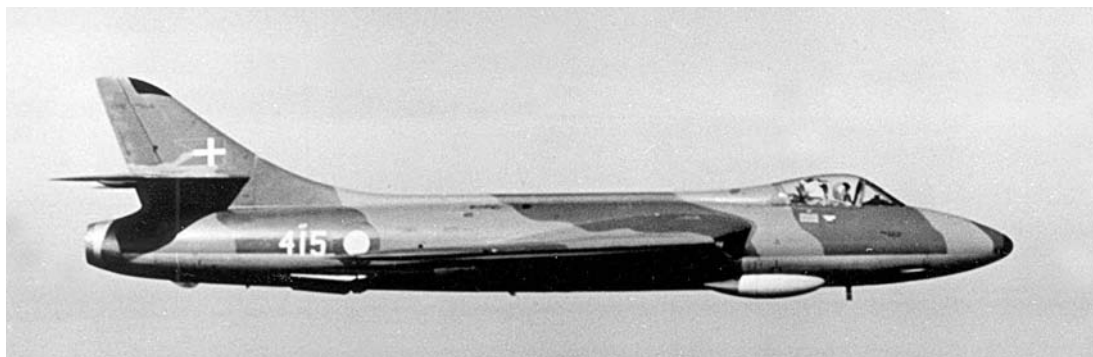
who needs a pilot?

denmark's self-landing hawk hunter

Hawker Hunter F.51 serial 47-415 of the Royal Danish Air Force on the runway at Skrydstrup after its pilotless landing on the morning of January 19, 1960. The radar equipment in the nose has been removed and the canopy has been shattered in the ejection, but otherwise the aircraft shows minimal damage.

VIA AUTHOR WITH THANKS TO ØYVIND ELLINGSEN OF WARBIRDS OF NORWAY





ON THE MORNING of January 19, 1960, *Flyvevåbnet* (Royal Danish Air Force) pilot *Kaptajn* Kurt Rasmussen was approaching Skrydstrup airbase in southern Denmark at the end of a routine test flight in Hawker Hunter F.51 47-415 when the rumble of the fighter's Rolls-Royce Avon engine suddenly began to wind down. The aircraft's abrupt loss of impetus pushed Rasmussen into his straps as the r.p.m. dropped like a stone. At 1,000ft (300m) and 345 m.p.h. (555km/h) the Hunter's engine flamed out, leaving Rasmussen with no choice other than to exchange speed for altitude by hauling the stick back to claw his way up to 3,000ft (900m). After several attempts at a relight, it was clear the engine had no more to give.

As his airspeed fell to 160 m.p.h. (260km/h) and the altimeter rapidly wound its way down to 1,300ft (400m), Rasmussen informed the tower that it was time to step out. As he pulled the blind on the Martin-Baker Mk 4 ejection seat, he felt the leg-restraining straps snap into action and heard a loud bang. A fraction of a second later he was spinning in space, frantically trying to orientate his toppled sense of direction. Moments later he hit the ground hard, his bonedome having been dealt a blow from the seat, which had become entangled in the parachute canopy's lines.

Shaken, but with only minor injuries to his head, Rasmussen was picked up within minutes by a helicopter, which returned him to Skrydstrup for medical attention. With the aircraft having displayed the aerodynamic characteristics of a brick moments before Rasmussen's ejection, all that was left to do was look for the tell-tale plume of black smoke rising from a nearby field and survey the mangled remains of the fighter. No plume. No remains. So what had become of the Hunter? We will come to that.

In June 1954 Sweden signed a contract for 120 examples of the export variant of the RAF's yet-to-be-delivered F.4, to be designated F.50, or

J 34 in Swedish service. A matter of days later fellow Scandinavian nation Denmark placed an order for 30 similar variants, to be designated F.51s and given *Flyvevåbnet* type number 47, which would be painted in small numerals above the individual aircraft's number on the rear fuselage.

The airframe

Hunter 47-415 was built at Kingston and made its first flight (50min) in the hands of Hawker production test pilot David Lockspeiser from Dunsfold on June 1, 1956. It was delivered on August 24 the same year to Ålborg airbase, to be

TOP Hunter 47-415 in service with the Royal Danish Air Force before the ejection incident in January 1960. All 30 Danish Hunters were built at Hawker's factory at Kingston. **BELOW** A portrait of *Kaptajn* (equivalent to an RAF Flight Lieutenant) Kurt Rasmussen taken around the time of his ejection from Hunter 47-415.



VIA AUTHOR



VIA AUTHOR

ABOVE Hunter 47-415 over the flat Danish farmlands. Like Sweden's J 34s, Denmark's F.51s were fitted with Rolls-Royce Avon 115s, which later had to be modified to overcome surge problems during gun firing. On completion the new-build Hunters were flown from the Hawker airfield at Dunsfold to Værløse, deliveries being completed in 1956.



MICK OAKLEY

ABOVE In the snug cockpit of the Hunter, there was little room for error when it came to ejection. Seen here is the largely complete cockpit of Hunter F.51 E-421, which served with Esk 724 of the Royal Danish Air Force during 1956–74. It is currently on display at Brooklands Museum (www.brooklandsmuseum.com).

put on strength with former Gloster Meteor unit *Eskadrille 724*, with which it made its first operational flight on September 6, 1956. The squadron participated in numerous Nato exercises during 1957–58, as well as regular exchanges with RAF, Dutch and Belgian Hunter squadrons, including a visit to No 43 Sqn at Leuchars in March 1958.

On July 28, 1959, with the Hunter having accumulated 196 flying hours, an engine fire broke out while 47-415 was starting up, the aircraft being sufficiently damaged to take it out of action until January 1960. Following a complete engine change the Hunter was ready by January 19 for a routine test flight, which was to be undertaken by Kaptajn Rasmussen.

The pilot

Born on July 19, 1934, Kurt Rasmussen joined Flyvevåbnet aged 19, and completed basic training on de Havilland Chipmunks at Avnø airbase in March 1955, before being posted to Canada for advanced training that June. Flying North American Harvards and Canadair CT-133 Silver Stars, Rasmussen graduated from his advanced flying training course in May 1956 before returning to the RDAF's *Traeningsfligten* (Training Flight) at Ålborg the following October, for conversion to the Republic F-84G.

In February 1957 Rasmussen, by now known among his colleagues as KUR, according to the three-letter name convention used by RDAF pilots and navigators, joined F-84G fighter-bomber unit *Eskadrille 725* at Karup, staying

“The fire crew arrived at the scene to find a slightly damaged Hunter and no pilot . . . the aircraft may even have beaten Rasmussen back to the airfield, to his amazement . . .”



JOHN COTTON VIA DAVID HASSARD

ABOVE LEFT The furrow created by the Hunter when it landed itself beside the runway at Skrydstrup. It slid along the snowy grass beside the runway, eventually sliding on to the tarmac, which slowed it down. **ABOVE RIGHT** The Hunter in its final position on the runway. Note the squadron badge on the forward fuselage beneath the canopy.

only four months before he was posted to Esk 724 at Ålborg and later Karup and Skrydstrup, to fly the Hunter.

Thus it was that Rasmussen found himself in the seat of 47-415 on the morning of January 19, 1960, with more than 450 flying hours on the shapely Hawker fighter in his logbook. Originally on the roster for a low-level interception practice sortie that morning, Rasmussen switched — owing to a shortage of available aircraft — to a test flight of 47-415, ready for flight following its engine change. The start-up proceeded as normal and nothing unusual was noted during the taxi out for take-off at 0905hr.

The incident

During the take-off roll the warning light for the No 2 generator came on, and three red “unsafe” undercarriage indicator lights flickered into life. As the Hunter climbed away, the warning lights continued to behave erratically. Rasmussen made a low-speed run past the tower for an inspection, the controllers confirming that the undercarriage was up and locked. After two more cyclings of the undercarriage the red lights remained unlit.

Satisfied that these were minor niggles, Rasmussen set about his test routine for the fighter, the first part of which was to climb to 40,000ft (12,200m), checking the engine r.p.m. for every 2,000ft (600m) of altitude. Both the jetpipe temperature and r.p.m. were within limits, although a cabin warning light blinked on when passing 10,000ft (3,000m), which went out

during the descent from 40,000ft for another climb test. A second climb was made to 48,000ft (14,600m) for further tests, which were concluded satisfactorily.

The test routine complete, Rasmussen began his descent back to Skrydstrup, performing a number of $4\frac{1}{2}g$ turns at approximately 430kt at 7,600 r.p.m. Approaching Skrydstrup from the east, Rasmussen had just called the tower with his height and speed information — 1,000ft and 300kt — when the engine began to run down and the drama began. Before ejecting, Rasmussen had trimmed the Hunter for a long glide towards Skrydstrup, as per standard procedure.

With Rasmussen launched into space, the aircraft, now reduced in weight, increased its angle of attack; and, extraordinarily, made a perfect deadstick landing — with the undercarriage still retracted — in the grass just to the north of the Skrydstrup runway, sliding on to the runway before coming to a stop. Not having been informed that the pilot had ejected, the fire crew arrived at the scene to find a slightly damaged Hunter and no pilot. The aircraft may even have beaten Rasmussen back to the airfield, to his amazement.

Although the Hunter was only lightly damaged, a decision was made not to rebuild it, as Flyvevåbnet plans at the time called for the reduction of each unit’s inventory of aircraft to a maximum of 16. Accordingly, Rasmussen’s ghost Hunter was struck off charge, succumbing to the scrapman’s torch despite having astonished onlookers with a perfect wheels-up landing.





AUTHOR'S PHOTOGRAPHS

OFF THE BEATEN TRACK

Ever turned a corner to find something unexpected? The Aviation Historian's intrepid aeronautical explorer **PETER DAVISON** investigates the stories behind the oddities that turn up in the most unusual places

WHILE I WAS visiting a military base in Colombia in 2008, rumours surfaced of a Douglas DC-4 in a theme park some 30 miles (50km) north of the Colombian capital, Bogotá. Naturally, I had to investigate. It was at the Parque Jaime Duque, where reconstructions of world icons and dinosaurs share space with three real aircraft; a DC-3, DC-4 and a Beech 18.

Douglas C-54A Skymaster serial 42-72302 (c/n 10407) was delivered to the USAAF on September 22, 1944, before being converted to a DC-4 for service with Pan Am as N88929, *Clipper Viking*, from April 1947. It was, however, very quickly transferred to Colombian national airline Avianca as HK-136. This aircraft carried the Colombian contingent to the Melbourne Olympics in 1956 on a journey via Mexico, San Francisco, Honolulu, Canton in China and Fiji in 61hr, thereby setting a new time record.

Flying for Aerotal from 1973, the aircraft suffered a non-fatal forced landing en route from Florencia to Neiva in August 1981 which put paid to its flying days.



ABOVE Douglas DC-4 HK-136 at the Parque Jaime Duque, Tocancipa, Colombia in 2008. The author explains: "On arrival I couldn't frame a decent uncluttered picture, but after visiting the other exhibits, I found it in clear view. Puzzled, I watched a while and, sure enough, it pivots in the wind. What a way to swing a prop(liner)..."

BELOW You're so vane — another view of the oldest swinger in town. To see the DC-4 from above, put co-ordinates N4-947849, W73-962159 into the "Fly to" box in Google Earth.



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The Supersonic Bedstead *Dr Andreas Zeitler* talks to test pilot Nils Meister about what Germany's ambitious Mach 2 VTOL experimental aircraft, the VJ101, was like to fly

Folland's Monoplanes Using newly-discovered material from the Royal Aero Club archive, *Ralph Pegram* re-evaluates Henry Folland's reputation as a biplane man



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